RAILWAY ENGINEERING

AND MAINTENANCE OF WAY

Vol. IV JUNE, 1908 No. 6

CARBURET BLACK... FOR SATISFACTORY SERVICE — Steel Cars, Bridges, and All Exposed Railway Work. WADSWORTH-HOWLAND CO., Chicago

RODGER BALLAST CAR CO. CONVERTIBLE CAR --See Page 8

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EAST WORKS — New Freight and Passenger Cars — TWO SEPARATE PLANTS — WEST WORKS — Rebuilt Coaches, Cars, Engines

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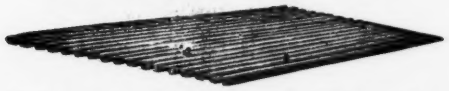

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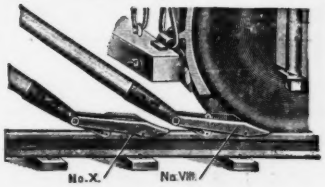

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Try an "ATLAS," it will pay for itself in a Few Hours' Use.

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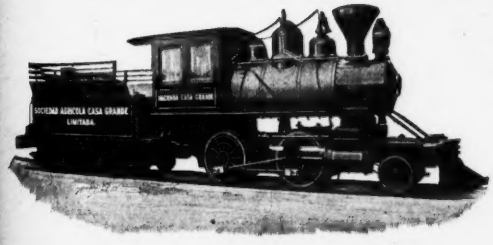

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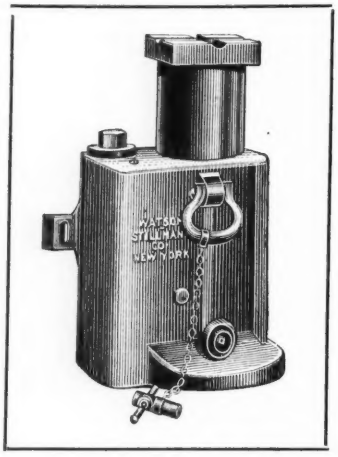

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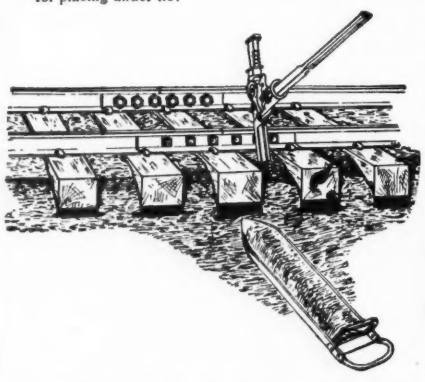
WALTERS'

BALLAST PLACING DEVICE

Patented March 21, 1905

Has been placed in service on eleven trunk lines and eight smaller railroads since April 1st.

FIG. 1—Showing ballast removed from end of ties to be raised, track jacked up and device in position to receive ballast for placing under tie.



We will guarantee that every particle of ballast will remain under tie and that machine will work in any kind of ballast.

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Satisfaction guaranteed or money refunded.

References: Any Bank in the City.

FIG. 2—Showing pan removed, ballast under tie, and cleaner ready to be withdrawn.

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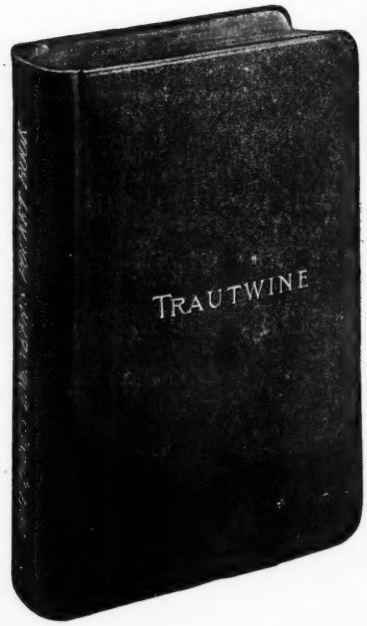

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John Wiley & Sons
43 East Nineteenth St.
NEW YORK

Railway Engineering
and Maintenance of Way

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CRANDALL PUBLISHING COMPANY

BRUCE V. CRANDALL, President WARREN EDWARDS, Vice-President C. C. ZIMMERMAN, Secretary
NORMAN F. REHM, Editor

OFFICE OF PUBLICATION: Security Building, Cor. Madison St. and Fifth Ave., CHICAGO Telephone Main 3185

Entered as Second-Class Matter April 13. 1905, at the Post Office at Chicago, Illinois, Under Act of March 3, 1879.

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¶ Advertising is both an art and a science, at least it should be. Every manufacturer should spend his advertising appropriation with greater care than he gives to any other expenditure. It is his business developer. It determines his business growth. His advertising opens up new fields, it brings him new customers.

¶ The daily or weekly publication is valuable chiefly because of its frequency. It forces among its readers an interest in the advertiser's product, it reminds him with a persistent frequency of a certain particular machine or appliance which at some time, either in the immediate or remote future, he may want to buy. The daily or weekly publication calls for constantly changing clever copy.

¶ The monthly or quarterly publication, appearing less frequently than the daily or weekly, calls for copy more fully descriptive of the device or product. Copy in a publication of this class should be changed less often, but should occupy larger space. Not only should the copy be well worded and displayed, but the advertiser should use large illustrations, full descriptions and detailed argument and facts regarding what he has to sell. Undoubtedly the returns, measured by dollars of advertising expense, are greater in monthly publications than in any other mediums. In the nature of things the daily is read for the day, the weekly for the week and the monthly for the month. So the dollar that has a chance to work for thirty days instead of seven brings better returns.

¶ Good illustrations, new cuts, clear-cut type, attractive borders, all well displayed. This you must have. The publisher will or should take care of that part of it. But more important still is what you illustrate and what you say about your business, your device, your product. Put yourself in the position of the railroad buyer. He is looking for complete but concise information regarding your particular device. He doesn't want to read a long description of what you have to sell, nor wade through a lot of "dope" about "its great advantages, its wonderful records, the life history of the inventor," etc. You are dealing with actual buyers. They want actual facts.

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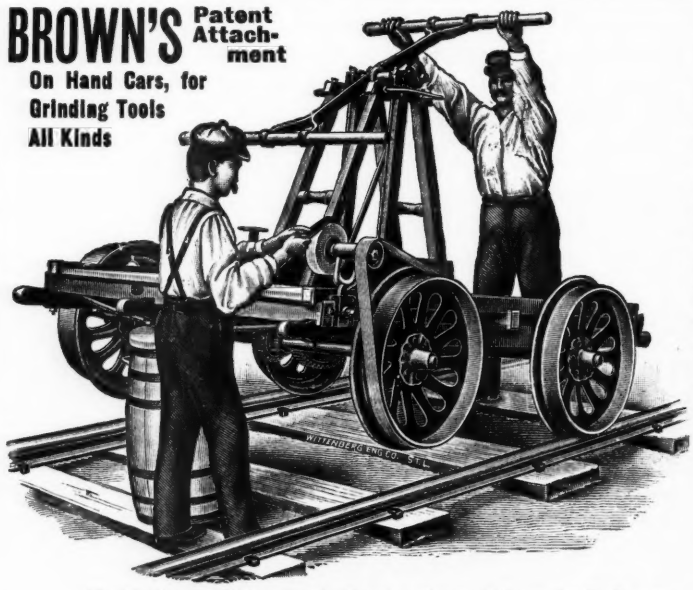

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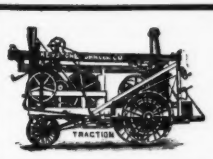

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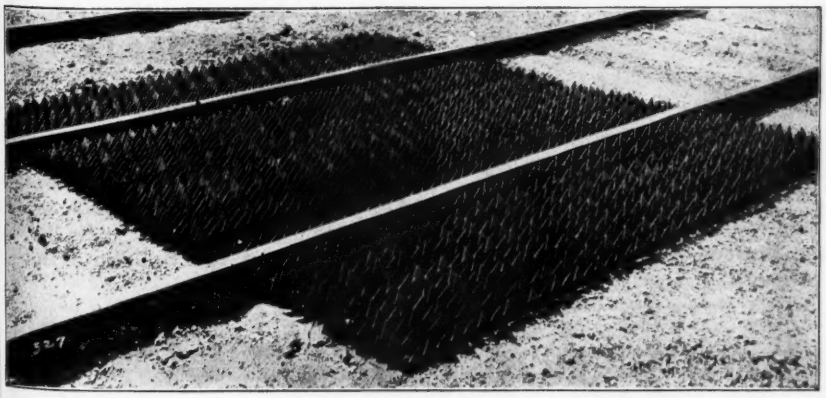

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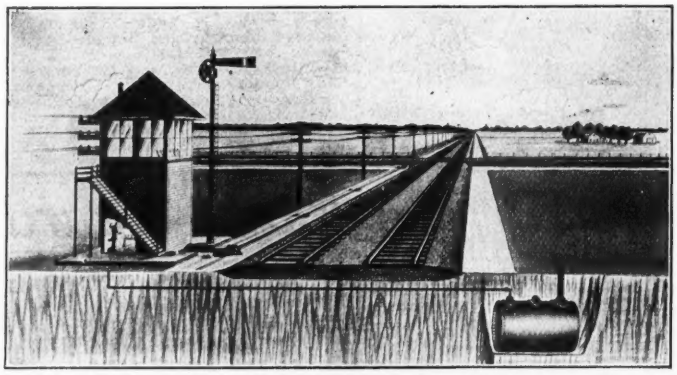

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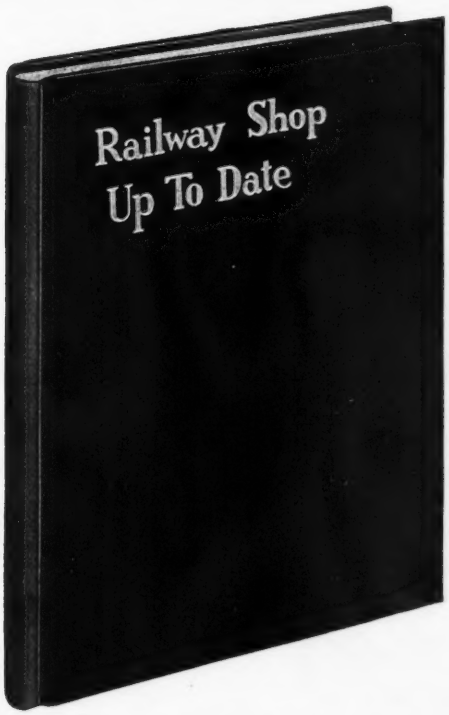

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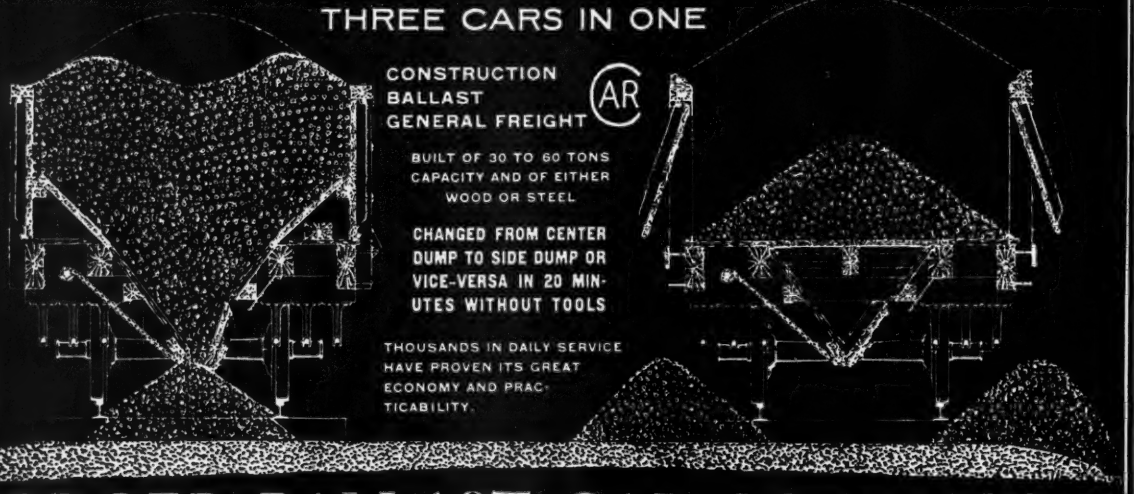
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Reinforced Concrete Columns.

THE investigation of concrete columns with hooped reinforcement, which has been made by Prof. Talbot, of the University of Ilinois, offers certain valuable suggestions to designers of reinforced concrete structures. For this reason the observations are printed elsewhere in this issue.

Some years ago the hooped style of reinforcement was developed by M. Considére and used in Europe. Considére found that concrete, reinforced with metal bands or wire spirals, had many advantages for numerous classes of work and he was the first to utilize this construction.

It has been learned by the preliminary investigation of Prof. Talbot that the apparent advantages of hooped reinforcement may not relate to ordinary construction because of the phenomenon exhibited by columns reinforced in this manner. The tests show the necessity of further investigation.

Storage of Coal

IN recent years many industrial organizations have provided for the storage of coal in large quantities to eliminate the possibility of a temporary coal famine, and the railroad companies in particular are interested in this problem of coal storage. Storage of coal in large quantities has caused a more thorough study of the weathering of coal, concerning which there were various opinions upon which reliable conclusions could not be based. At this time the subject is still under discussion, but research work is being conducted to determine the best methods of storing coal.

In a bulletin published by the University of Illinois Experiment Station a brief historical review of investigations on the weathering of coal was included. The opinions expressed by authorities gave factors that affect the deterioration of coal, such as size of coal, moisture, temperature, accessibility of oxygen and the composition of the coal. Each of the above mentioned factors has some effect on the weathering of coal, but how and to what extent they influence deterioration is not thoroughly understood.

In the bulletin, mentioned above, the results of coal storage in small samples of about 100 lbs. were given. It was found that submerged coal did not lose appreciably in heat value and that the loss from outdoor exposure varied from 2 to 10 per cent. Coal in dry storage gave no better results than coal in the open except with high sulphur coals. In most cases all appreciable losses in heat value were in the first five months, and in the following four months losses were comparatively small. The results of the experiments with small samples are thought to be worthy of consideration in the analysis of deteriorating effects upon coal stored in large quantities. It is stated that further study is to be made with reference to actual storage conditions. The opinions, which have been given in the past, are at variance as to the weathering of coal.

It is necessary that further investigations be made in order that the causes and extent of the deterioration of coal in storage will be more accurately determined. The conditions under which storage is made may then be modified in some cases to maintain a greater heating value for the coal.

Outlining of Tests

A PRACTICAL method of beginning an investigation is described in Bulletin No. 329 of the United States Geological Survey by Richard S. Humphrey. An outline for a series of tests was prepared by a committee for the investigation of concrete and reinforced concrete. The plan divided the experimental work into four sections and under each section subdivisions were made, outlining the tests in detail.

The first section of the plan covers the examination and classification of materials entering into the composition of concrete, and the second covers tests and classification of mortars made with Portland cement and the materials examined under the first section. The third section deals with concrete, tests and classification of this composite building material, and the fourth section includes tests of reinforced concrete beams, columns, slabs and arches.

The value of this plan lies in the exhaustive treatment which it provides for. The first section lays the foundation and the second and third lead up to the fourth in which the data are secured for conclusions. With a definite object in mind the groundwork is clearly outlined. Upon the thoroughness of the elementary investigation will depend the strength of the final conclusions.

The principles, upon which this series of tests has been based, should be exemplary for other work along similar lines. It frequently occurs that a previous analysis of the requirements in experimental work has not been conducted with the usual result of unreliability of the final conclusions.

Important Investigations

IN the May issue of this paper an outline of the committee work of the American Railway Engineering and Maintenance of Way Association was published. It indicates that investigations will be conducted this year by railway engineers which will have an important bearing upon railway construction.

There have been many papers on the subject of ballast, and while the advantages and disadvantages of the various kinds of ballast have been thoroughly discussed and are understood, yet a review of the practice in this line and the results of same will be of inestimable value. The combined opinions of men familiar with the work will render conclusions that may form a reliable basis for future roadbed construction.

Another subject upon which sufficient data is not compiled is the causes of failure of treated and untreated ties. The results of the use of various kinds of spikes and tie plates upon the life of wood ties would be of value in the determination of the best designs to use in consideration of the life of ties. Investigation of concrete and reinforced structures will be conducted by several committees. Reinforced concrete coaling stations and storage bins and also reinforced concrete roofs for roundhouses will be investigated by the committee on buildings. At the last annual meeting of the association it was learned that various opinions were held by railway engineers as to the availability of reinforced concrete for roundhouse roofs because of the injurious effects that might arise from gases in the roundhouse. The committee on masonry will have under consideration the design, cost and construction of reinforced concrete trestles as well as the design of retaining walls and abutments. The results secured in the use of concrete fence posts and their design and cost will be reported on by another committee.

The preparation of general rules for the government of employees of the maintenance of way department and also special rules for foremen and other employees will supplement previous reports of the committee on uniform rules.

A committee on wood preservation has been added, and in view of the increased use of treated timbers this committee should develop an interesting as well as valuable report.

In connection with this work railroad men should bear in mind that it is their duty to furnish data from their experience to the various committees of the association which was organized to promote better construction.

Devices for Spring Rail Frogs

OF the many devices used with spring rail frogs, a few are illustrated on other pages of this issue. Opinions as to the value of the devices designed for the same purpose are, of course, at variance. They should be simple and durable, as well as capable of absolute performance.

The design of spring which is used most extensively consists of two boxed coils on each side of frog with a bolt passing through frog. This spring is located either ahead of or back of the point. When ahead of the point, it may be placed about 12 ins. from the point, at the throat or in the mouth of frog; when back of the point, it is from 12 to 20 ins. from the point. Another design consists of a spring on the side opposite the spring rail and connected to the spring rail by a rod, passing under the rails and fastened to the reinforcing plate of the spring rail. A third design consists of two boxed springs located at side of spring rail which is operated by means of hinged arms.

The anti-creeper prevents movements of the spring rail with relation to the fixed rails of the frog, and

thereby keeps the spring from binding and checking the movement of the spring rail. One of the devices used for the purpose is a toe block. A second device consists of a strap bolted to the spring and turnout rails at the mouth of frog. A third device consists of a pivoted arm in the mouth of frog, the arm being attached to the fixed wing rail and the spring wing rail by clamps and bolts. A fourth method of preventing creeping is by means of a hinge rail attached to the main rail by a bolt hinge and to the movable part or spring rail by bolts. Other devices consist of one or two hinged links on spring rail side and are in combination with spring or hold-down devices.

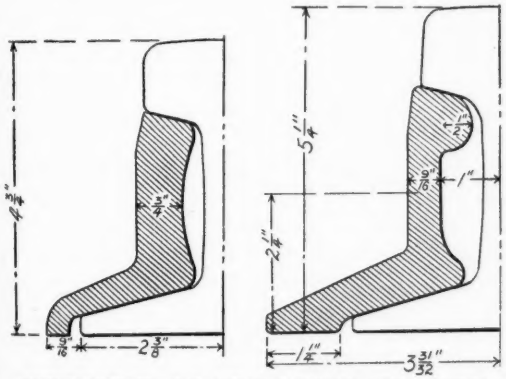
The holding-down devices for the spring rail usually act as stops. A common hold-down device consists of guide box and a bar or lug projecting from the spring rail. Instead of the separate bar, the reinforcing strap is often bent out to form projections which slide in the guide boxes. In most cases two of these devices are used, one at the heel end of the spring rail and the other at or ahead of the point. In combination with two of the devices described above, a plate and rod are sometimes used at the heel end, the rod passing through the spring rail and riveted or bolted to the point rails. Another method of holding down the rail is to rivet the spring rail to a plate at the heel end. Other devices consist of hinged arm combination anti-creeper devices.

Besides the holding-down devices there are from one to five other stops used for the spring rail. Various designs of rail braces are used, the braces being cast with the tie plate, riveted or bolted to it. Tie plates are also bent up at the ends to form stops for the base of the spring rail.

Standard Rail Joints

THE design of a rail joint, which is to fulfill the requirements of service, is by no means an easy problem. To produce at the joint the effect of a continuous rail and to have the joint both durable and economical in first cost as well as cost of installation, are a few conditions upon which the design must depend. There are in use today a large number of different designs, varying in length, cross-section and spacing of bolts and these are described briefly in the following paragraphs.

The angle bar is the most common design of joint. In the accompanying illustrations several cross-sections



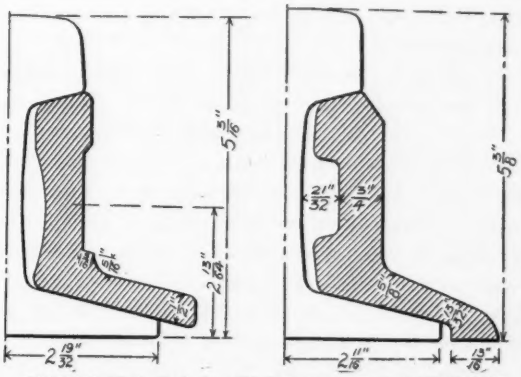
SECTIONS OF MO. PAC. AND C. R. R. OF N. J RAIL JOINTS.

of angle bars in use on American railroads are shown. The angle bars illustrated are not designed for the same weight of rail, but the drawings indicate the variation in section. It will be noted that there is in all cases a maximum bearing surface between bar and rail, allowance being made, of course, for wear of the joints. The amount of metal at the top is greater than that at the middle and in some cases there is a marked difference. The purpose is to strengthen the joint where the stresses are excessive. The section is decreased near the middle, affording a saving in metal.

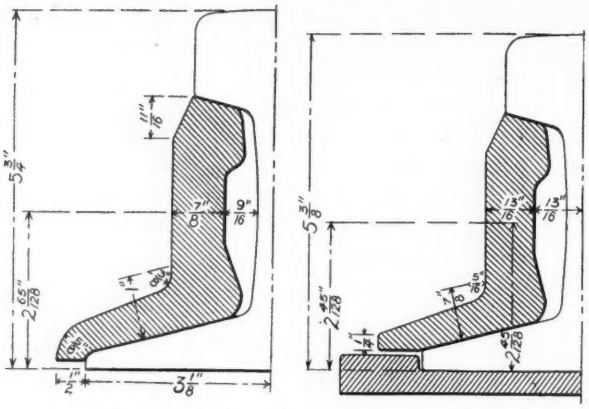
The angle bar is also used in combination with a base plate, extending the length of bar. This combination affords a joint of greater strength because the base plate gives a larger and better bearing surface to the rail.

Instead of the angle bar and base plate, the continuous joints may be used. In a simple form it consists of two pieces, combining the base plate with the angle bar and leaving a clearance of about ½ inch between the two halves of the base plate. In another form, base plate is made separate and bears at the sides upon short projections of the splice bar. The latter form is a patented joint, termed the Wolhaupter.

Another form of joint in use is the reinforced joint which consists of angle bars having deeper sections about 5 ins. on each side of the center line of joint. The projection extends down below the rail between the ties. It serves to give additional strength and solidity at the center of joint. Two designs of this form are the Duquesne and 100 per cent splice bars, both of which are



SECTIONS OF C., B. & Q. AND C. R. R. OF N. J. RAIL JOINTS.



SECTIONS OF B. & O. AND C., ST. P., M. & O. RAIL JOINTS.

used on the Pennsylvania Lines. The Bonzano joint is similar to the above. In the latter the section of metal is the same throughout, but the central section of the flange is bent vertically downward between the ties.

The general requirements of the Standard rail joint, which were adopted by the American Railway Engineering and Maintenance of Way Association, are as follows:

(1) It should connect the rails into a uniform continuous girder.

(2) It should be strong enough to resist deformation or taking permanent set.

(3) It should prevent deflection or vertical movement of the ends of the rails and permit movement lengthwise for expansion.

(4) It should be as simple and of as few parts as possible to be effective.

(5) Finally, its cost must not be prohibitive.

In the accompanying tables for 4 and 6-hole rail joints, the length of joint, spacing of spike holes, spacing of bolt holes and distance between rail ends are given.

Short rail joints are usually 24 or 26 ins. long and have 4 bolt holes. As is shown by the table, there is not much similarity in the spacing of bolt holes.

The long rail joints are from 28 to 40 ins. in length and have 6 bolt holes. The spacing of bolt holes for these joints also varies greatly. The recommendation for standard drilling of rails, adopted by the American Railway Engineering and Maintenance of Way Association, calls for a distance of 5 ins. between holes, but it is shown that in only one case does the spacing conform to this recommendation.

BALTIMORE & OHIO RAILROAD.—The 6-hole angle bars for 85 and 100-lb. rails are 28 ins. long. The diameter of holes is 1⅛ ins. and the oblong holes are 1½ ins. wide. Round and oblong holes alternate. Diameter of bolts is 1 in. The clearance between 60-ft. rails is 5/16 in. and clearance between 35-ft. rails is 3/16 in. The slots in angle bars are made ¾ in. wide and just deep enough to bring the spike against the base of rail. The 4-hole angle bars for 85 and 100-lb. rails are 26 ins. long. The oblong bolt holes are made 1 5/16 ins. wide.

CENTRAL RAILROAD OF NEW JERSEY.—The 6-hole angle bar for 85-lb. rail is 30 ins. long. The diameter of round holes is 1 in., oblong holes being 1 5/16 ins. wide. Round and oblong holes alternate. Bolts are ⅞ in. in diameter. Spike holes are ¾ in. wide.

The 6-hole angle bar for 90-lb. rail is 28 ins. long. Round holes are 1 1/16 ins. in diameter and oblong holes 1 5/16 ins. wide. Bolts are ⅞ in. in diameter.

CENTRAL OF GEORGIA RAILWAY.—The 4-hole angle bar for 80-lb. rail is 26 ins. long. The diameter of round holes is 1 in. and oblong holes are 1¼ ins. wide. Oblong and round holes alternate. Bolts of ⅞ in. diameter are used. Weight of angle bars per pair is 49.82 lb. Spike holes are ⅝ in. wide.

CICINNATI-NORTHERN RAILROAD.—The 4-hole angle bar for 70-lb. rail is 24 ins. long. The round holes are of 1 in. diameter and width of oblong holes is 1¼ ins. Bolts are of ⅞ in. diameter. Spike holes are 11/16 in. wide and ⅝ in. deep. Oblong and round bolt holes alternate.

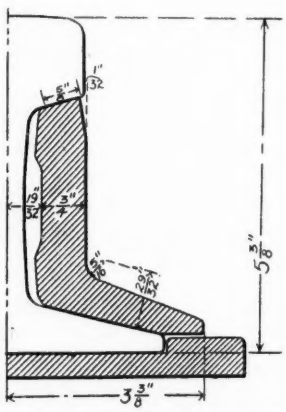
CHICAGO & ALTON RAILWAY.—The 6-hole angle bar for 80-lb. rail is 29 ins. long. The diameter of round bolt holes for inside angle bars is 1 in. and for outside angle bars the width of oblong hole is 1¼ ins. Bolts of ⅞ in. diameter are used. The spike holes are 13/16 in. wide and ¾ in. deep. Weight per pair of angle bars is 55.7 lb. A standard 29-in. Weber joint is also used.

CHICAGO & NORTHWESTERN RAILWAY.—The 4-hole joint for 90-lb. rail is 26 ins. long. Oblong bolt holes are used, being 15/16x1 5/16 ins. The bolts are 13/16 in. in diameter. Spike holes are 1 in. wide and ¾ in. deep.

CHICAGO & WESTERN INDIANA RAILROAD.—The 6-hole angle bars for 80-lb. rail are 36 ins. long. The bolt holes are 15/16x1¼ ins. Spike holes are ¾ in. wide. Bolts of ⅞-in. diameter are used.

CHICAGO, BURLINGTON & QUINCY RAILROAD.—The 6-hole angle bar for 100-lb. rail is 36 ins. long. Round bolt holes are 1 1/16 ins. in diameter and oblong holes are 1 5/16 ins. wide. Round and oblong holes alternate. Spike holes are ¾ in. wide. Bolts of 1-in. diameter are used.

The 6-hole angle bar for 85-lb. rail is 35½ ins. long.



SECTION OF C. & N. W. RAIL JOINT.

TABLE No. 1—FOUR-HOLE ANGLE BARS.

RAILROAD	a	b	c	d	e	f	k
B. & O.	26	4	2	5	5	6	3/16
C. R. R. of N. J.	24	5	1 15/16	3	6	6	1/4
C. of G.	26	6	2	4	7	4	1/4
Cin. North	24	5 1/2	3 1/2	4 13/16	5	4 1/2	1/4
C. & N. W.	26	5 13/16	2 5/16	4	6	6	3/16
C. R. I. & P.	26	6	2 1/2	3 7/8	6	6 1/2	1/4
C. St. P. M. & O.	24	5 7/16	2 1/16	3	6	6	3/16
D. & R. I.	26	5 13/16	1 5/16	4 3/8	6	5 13/16	1/4
G. R. & I.	26	5 3/8	2 5/16	3 23/32	6	6 5/16	3/16
G. N.	24	3 1/2	2	4 1/2	5	5	1/4
Har. Lines	27	6 1/8	3 5/8	5 1/4	5 1/2	5 1/2	1/4
I.C. R.	24	4 1/4	1 5/16	3	6	6	.....
K. C. M. & O.	26	5 3/8	1 7/8	5 1/16	5 1/2	4 1/2	1/4
M. C. R. R.	25	4 7/16	1 5/16	3 1/2	6	6	.....
Mo. Pac.	26	4	2	6 1/4	4 1/2	4	3/16
N. Y. N. H. & H.	24	4 3/8	1 3/8	2 1/2	7	5	1/4
Pere Marq.	23	5 5/16	1 13/16	3	6	5	.....
P. & R.	24	5	1 5/16	3	5	8	1/4
Wabash	24	6 1/2	2 1/4	4	5	5	.....

NOTE—See Diagram No. 1 for Interpretation of Letters.

Round bolt holes are 15/16 in. in diameter and oblong holes are 1 3/16 ins. wide. Round and oblong holes alternate. Spike holes are 3/4 in. wide. Bolts of 7/8 in. diameter are used.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY.—The 4-hole angle bar for 85-lb. rail is 26 ins. long. Round bolt holes are 1 1/8 ins. diameter and oblong holes are 11/16 ins. high and 1 3/8 ins. wide. Round and oblong holes alternate. Spike holes are 3/4 in. wide and 13/16 in. deep. A base plate is shown on the drawing.

This base plate is also used where it is necessary to reinforce joints on lighter rail sections and the punching conforms with that of the angle bar used.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA RAILWAY.—The 4-hole angle bars for 80 and 90-lb. rail are 24 ins. long. Round bolt holes are of 1-in. diameter and oblong holes are 1 5/16 ins. wide. Round and oblong holes alternate. Bolts are of 7/8 in. diameter. Spike holes are 3/4 in. wide and 15/16 in. deep. Base plates are shown on the standard drawings.

DELAWARE & HUDSON COMPANY.—The 6-hole angle bar for 90-lb. rail is 30 ins. long. Round bolt holes are of 7/8 in. diameter and oblong holes are 7/8x1 1/8 ins. One angle plate of a pair has round holes and the other oblong holes. Spike holes are 3/4 in. wide and 3/4 in. deep.

DENVER & RIO GRANDE RAILROAD.—The 4-hole angle bar for 85-lb. rail is 26 ins. long. Round bolt holes are of 1-in. diameter and oblong holes 1 1/4 ins. wide. Round and oblong holes alternate. Spike holes are 5/8 in. wide and 25/32 in. deep. The weight of a pair of bars is 51.4 lb.

GRAND RAPIDS & INDIANA RAILWAY.—The 4-hole angle bar for 85-lb. rail is 26 ins. long. Round bolt holes are 1 1/8 in. diameter and oblong holes are 1 3/8 ins. wide. Inside angle bar has oblong holes and outside has round holes. Bolts are of 1-in. diameter. Spike holes are 11/16 in. wide and 3/4 in. deep.

DIAGRAM NO. 2.

DAGRAM NO. 1.

GREAT NORTHERN RAILWAY.—The 4-hole angle bar for 85-lb. rail is 24 ins. long. Round bolt holes are of 1-in. diameter and oblong holes are 1 5/16 ins. wide. Round and oblong holes alternate. Spike holes are 11/16 in. wide and 9/16 in. deep. A Wolhaupter rail joint is also used.

HARRIMAN LINES.—The 4-hole improved angle bar for 90-lb. rail is 27 ins. long. Bolt holes are 1x1 1/4 ins. Spike holes are 3/4 in. wide. The weight per pair is 71.3 lb. The 27-in. continuous joints weigh 40.3 lb. each.

ILLINOIS CENTRAL RAILROAD.—The 6-hole angle bar for 85-lb. rail is 40 1/2 ins. long. Round bolt holes are 1 5/32 ins. in diameter. Spike holes are 11/16 in. wide and 1/2 in. deep. The weight per pair is 80 lb.

INTERCOLONIAL RAILWAY.—The 4-hole angle bar for 80-lb. rail is 24 ins. long. Oblong bolt holes are 15/16x 1 1/4 ins. Spike holes are 3/4 in. wide and 25/32 in. deep.

LEHIGH VALLEY RAILROAD.—The 6-hole angle bar for 90-lb. rail is 28 ins. long. Oblong bolt holes are 15/16x 1 3/16 ins. Spike holes are 3/4 in. wide and 3/4 in. deep. The weight per pair of angle bars is 59 1/2 lb.

KANSAS CITY, MEXICO & ORIENT RAILWAY.—The 4-hole angle bar for 70-lb. rail is 26 ins. long. Oblong bolt holes are 7/8x1 1/8 ins. Bolts are of 3/4-in. diameter. Spike holes are 3/4-in. wide and 5/8 in. deep. Weight of angle bars per pair is 43.3 lb.

MICHIGAN CENTRAL RAILROAD.—The 4-hole angle bar for 80-lb. rail is 25 ins. long. Round bolt holes are of 1-in. diameter and oblong holes are 1 1/4-ins. wide. Round and oblong holes alternate. Spike holes are 5/8-in. wide and 3/4-in. deep.

The 6-hole angle bar for 100-lb. rail is 38 ins. long. Round bolt holes are of 1 1/8 ins. diameter and oblong holes are 1 3/8 ins. wide. Round and oblong holes alternate. Spike holes are 5/8 in. wide and 13/16 in. deep.

MISSOURI PACIFIC RAILWAY.—The 4-hole angle bar for 85-lb. rail is 26 ins. long. Round bolt holes are of

TABLE No. 2—SIX-HOLE ANGLE BARS.

RAILROADS	a	b	c	d	e	f	g	k
B. & O.	28	5 1/2	3 1/2	2 1/2	5 1/2	4	4	3/16
C. R. R. of N. J.	30	6 1/2	2	4	5	4	4	1/4
C. & A.	29	5 3/4	4 17/32	3	4 1/2	4 1/2	5	3/16
C. & W. I.	36	11	7	3 1/2	6	6	5	1/4
C. B. & Q.	36	2 1/4	2 1/4	4 1/2	5	5	5	3/16
D. & H.	30	6 1/8	5 7/16	3 3/4	4 3/32	4 3/32	4 3/16	3/16
Har. Lines	29	5 3/4	4 1/4	3	4 1/2	4 1/2	5	3/16
I. C. R. R.	40 1/2	.....	.....	4 1/4	9	4 1/2	4 1/2	3/8
L. V. R. R.	28	6	2	4	4	4	4	3/32
M. C. R. R.	38	4 7/8	2 1/4	3	8	6	4	.....
N. Y. C. & H. R.	36	5 3/8	2 3/8	4	5 1/2	5 1/2	5 1/2	1/16
P. L. W. of P.	33	7	5	3	6	5	5	3/16
P. & R.	30	6 1/2	2	4	5	4	4	1/4

NOTE—See Diagram No. 2 for Interpretation of Letters.

1 in. diameter and oblong holes are 1 5/16 ins. wide. Round and oblong holes alternate. Bolts are of 1 in. diameter. Spike holes are 11/16 in. wide and 25/32 in. deep.

NEW YORK CENTRAL & HUDSON RIVER RAILROAD.—The 6-hole angle bar for 80-lb. rail is 36 ins. long. Round bolt holes are 1 in. diameter and square holes measure 15/16 in. Round and square holes alternate. Spike holes are 11/16 in. wide and 9/16 in. deep. Weight of angle bars per pair is 64.5 lb.

The 6-hole angle bar for 100-lb. rail is 36 ins. long. Round bolt holes are 1 in. diameter and square holes measure 1 1/16 ins. Weight of angle bars per pair is 80 lb.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD.—The 4-hole angle bar for 100-lb. rail is 24 ins. long. Round bolt holes are of 1 in. diameter and oblong holes are 1 3/32 ins. wide. Round and oblong holes alternate. Spike holes are ¾ in. wide and 15/16 in. deep.

PENNSYLVANIA LINES WEST OF PITTSBURGH.—The 6-hole angle bars for 100-lb. rail are 33 ins. long. Round bolt holes are 1 1/16 ins. in diameter and oblong bolt holes are 1 1/16x1⅜ ins. Spike holes are 11/16 in. wide and ¾ in. deep. Among the standard rail joints are the Duquesne splice bar, 100 per cent. splice bar and Bonzano splice bar.

PERE MARQUETTE RAILROAD.—The 4-hole angle bar for 85-lb. rail is 23 ins. long. Round bolt holes are 1⅛ ins. in diameter and oblong holes are 1⅜ ins. wide. Round and oblong holes alternate. Spike holes are ⅝ in. wide and 25/32 in. deep.

PHILADELPHIA & READING RAILWAY.—The 6-hole angle bar for 90-lb. rail is 28 ins. long. Round bolt holes are 31/32 in. in diameter and oblong holes are 1 1/16x 1 5/16 ins. Round and oblong holes alternate. Spike holes are ¾ in. wide and 1 in. deep.

WABASH RAILROAD.—The 4-hole angle bar for 80-lb. rail is 24 ins. long. Round bolt holes are 1 in. in diameter and oblong holes are 1¼ ins. wide. Round and oblong holes alternate. Spike holes are 11/16 in. wide.

Preservation of Ties

CONCERNING the preservation of ties by sterilization, a recent consular report gives the following translation of an article published in German journals:

With the gradual diminution of the world's timber supply the problem of substitution for the wooden cross-tie in railroad construction is being given increasing attention in the railway world. Already the steel cross-tie is being introduced here and there in Europe, but the idea still prevails that by impregnation with certain chemicals the decay of the wood cross-tie may be prevented to a degree rendering it far more useful and financially preferable than the metallic substitute.

Important experiments have recently been conducted under the supervision of the management of the French government railways for the purpose of determining the effect of sterilization of cross-ties on their durability. The decay being organic, principally, the investigators concluded that the fermentative and germinating basis of this action would be prevented by sterilization of the wood, or, rather, of the juice harboring these organic agents. Impregnation by chemical antiseptics heretofore resorted to had been more or less unsatisfactory because of the impossibility of penetrating the whole log with the liquid. Any crack in the log would therefore reopen it and lay bare such parts as were not reached by the previous impregnation. The new experiments exposed the log to a stream of steam, and the fact was established that all sizes of the wooden blocks subjected to this treatment were equally well saturated and that the heat rapidly penetrated the wood.

These interesting experiments have advanced sufficiently to awaken strong hopes of the investigators in the direction of the discovery of a method of preservation of railway cross-ties much superior to that of impregnation by chemicals.

Surprise Signal Tests

A summary of the results of surprise tests on the lines of the Union Pacific and Southern Pacific railroads for the month of March shows an efficiency percentage of 98.8 for the enginemen. During the month 1,258 tests were made.

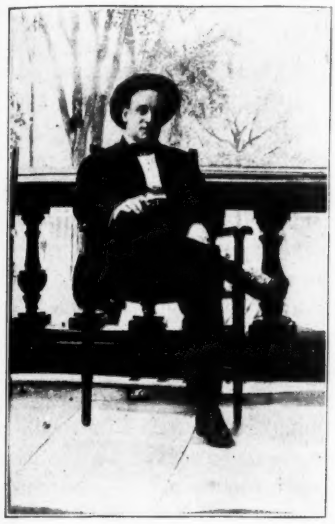
These tests are part of the general scheme for insuring safe travel on the Harriman lines. The installation of automatic block signals has progressed to a large extent on the Union Pacific-Southern Pacific system. Recently a training school car was fitted out, to move from one point to another for the instruction of employes. Officials of long experience explain the various kinds of signals and safety devices to the men, who are taught how to operate them in the proper manner.

The surprise tests consist of flashing all kinds of signals upon unsuspecting enginemen. At dozens of places, at all times of the day and night, the tests are made. They must be obeyed absolutely, else severe discipline will be meted out. Running past a danger signal means dismissal for the culprit. In the March tests the small number of violations, amounting to about 1 per cent, were not of the kind that might have caused serious accidents.

Eighteen kinds of regular signals were employed, besides specials. They included torpedoes, fusees, stop flags, reversed lights, extinguished lights, semaphore arms at danger and lantern and hand signals.

It is not only occasionally that these tests are conducted, but every month and every week in the year. It is now an established branch of the railroad's activity. Responsible officials do the work and carefully tabulate the results. Thus every engineman's record for carefulness is at hand. The benefits of the block signals and the elaborate tests are easily apparent in the reduced number of accidents.

Hugh M. Wilson



HUGH M. WILSON.

THE personality at the head of any business always makes itself felt and known throughout the entire organization. This is especially true in the journalistic field, the personality of the publication reflects the personality of the publisher. Mr. Hugh M. Wilson, who has for a number of years been at the head of the company publishing the Railway Age, has made that publication known far and wide in railway circles.

We are not attempting to give our readers any news in referring to the consolidation of the Railway Age and the Railroad Gazette; but it seems eminently fitting that some mention should be made in the columns of this paper of the retirement (temporarily, we hope) of the man who made the Railway Age. Mr. Wilson, for a newspaper man, is of such a retiring and diffident nature that we have found it impossible to persuade him to furnish us with a photograph of himself, of the regulation size and style. We feel sure, however, that his many friends will be interested in the accompanying picture which was taken a few years ago at Saratoga, during the convention of the Railway Master Mechanics' and Master Car Builders' Associations.

Mr. Wilson is represented as resting—how unusual. It certainly is, for the energetic publisher of the convention "Daily" was always at work. And this in large measure has been the secret of the success which Mr. Wilson has made in his journalistic career. We understand that he is now to take a long and well deserved rest. The future of the Age will be in the hands of the publishers of the Railroad Age Gazette of New York City.

Mr. Wilson, through his publication, has been one of the leaders in journalism in the railway field. The Railway Age did an important and effective work for the American Railway Engineering and Maintenance of Way Association during its organization period and the first days of its history. More than that, it has continued in the way in which it began, and from year to year it has given not only the report of the annual meeting of the association, but in its special issue following the convention it has contributed much of value to current railway literature.

Perhaps the "Daily," which has appeared at the annual conventions of the Master Mechanics' and Master Car Builders' conventions for many years, better reflects the personality of its publisher than any of the other enterprises of the Railway Age. Mr. Wilson did pioneer work in this field and did it well. The seven issues were filled with complete records of the papers and discussions in the convention hall, descriptions of the many exhibits and stories of the always interesting social life of the conventions.

We do not want to be led into writing an obituary—far from it. We wish Mr. Wilson "bon voyage" and hope to welcome him back in good time to our fraternity—the best, biggest and broadest in the country—the fraternity of the railway and railway supply men.

Railway Signal Association

The discussion of preliminary reports on subjects of the next annual meeting in October was the important business of the meeting of Railway Signal Association in New York on May 12th. The progress reports included the following: Mechanical Interlocking, by C. J. Kelloway, chairman; Standard Specifications for Electric Interlocking, by B. H. Mann, chairman; Storage Batteries, by A. H. Yocum.

The committee on rubber-covered wire reported that the subject was now under consideration. Mr. H. M. Beck, of the Chloride Accumulator Co., read a paper, entitled "The Storage Battery in Signal Service." Resolutions of regret at the death of Walter G. Berg were passed. It was announced by President Rudd that reports for the annual meeting must be presented by August 1st.

Advance in Rates

THE twenty-first annual report of the Interstate Commerce Commission outlines the position of the commission in regard to the restraint of advances in rates. The following paragraphs are taken from the report.

Under the operation of the Interstate Commerce Act the right to initiate interstate rates rests entirely with the railway, which may, by giving thirty days' notice, put into effect any rate or any regulation or practice affecting a rate which it sees fit. The commission is not required to approve these rates and has no authority whatever to condemn them. It can only act upon a rate so established by the railway in case a formal complaint is filed attacking that rate and after a full hearing. This is the express provision of the statute.

It is certainly just that carriers should not be required to reduce their transportation charges, nor to alter their rules or practices affecting such charges, without opportunity to be heard upon their part, for these charges are, in essence, the property of the railway. It seems, therefore, ordinarily a just provision to require that formal notice shall be given the railway, with opportunity to justify its rate, before a reduction is ordered.

Locomotive Terminal and Car Repair Shop

Illinois Central Railroad, Birmingham, Ala.

THE Illinois Central Railroad has recently completed a locomotive terminal and car repair yard, together with the necessary shop facilities, which embrace a number of features representative of a very serviceable arrangment of an isolated terminal of this character. It is designed to provide for locomotives running and emergency repairs and for freight car general repairs. The plant is located at East Thomas, near Birmingham, Ala., and is tributary to the freight classification yard adjacent to the main lines of the Illinois Central Railroad and the Frisco System. In fact, the roundhouse and shops are to be used jointly by the two railroads until the Frisco erects a shop of its own, which is now planned to occupy a site on the side of the freight yards opposite to the Illinois Central's repair plant.

The plant includes an engine terminal yard, 20-stall roundhouse, freight car repair yard embracing 4 tracks, wood working shop, blacksmith shop, machine shop, boiler room, pump and compressor room, engine room and store and oil house. The general layout is illustrated by the accompanying plan drawing.

CLASSIFICATION YARD.

The classification yard, as now operated, contains 7 tracks parallel with the main line. The capacity of the yard, however, is to be enlarged as required, by the location of additional tracks on the property lying between the present system of tracks and the roundhouse, sufficient area having been reserved for this purpose.

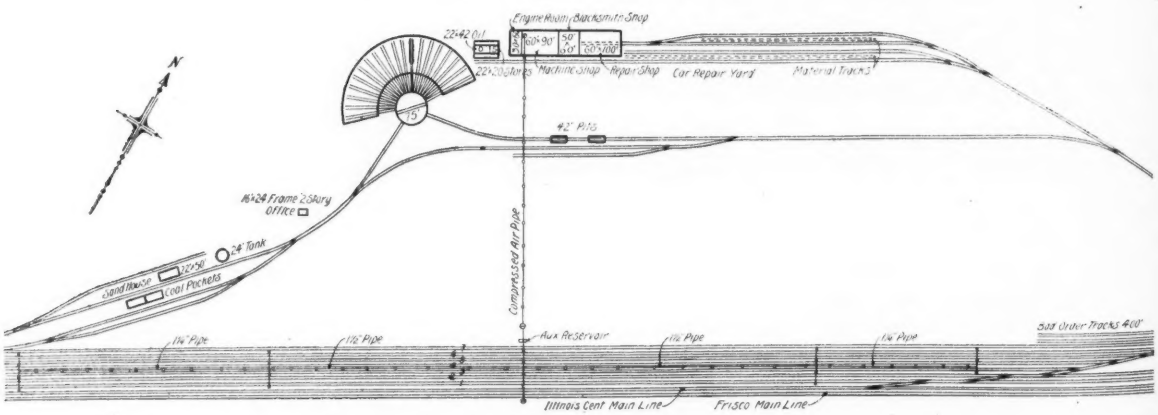
LOCOMOTIVE TERMINAL YARD.

Locomotives enter the roundhouse from the east end of the yard and in leaving the house pass toward the west end of the yard. The incoming track is served by two cinder pits, each 42 feet long. The outgoing track is served by a coal chute containing two pockets, each of 125 tons capacity, a sand house and a 24-foot water tank. Parallel with the incoming track and tributary to the cinder pits are two service tracks. The outer track is for cinder cars, while the inner track is traveled by a locomotive crane equipped with a clam-shell bucket. Cinders are transferred from the pits to cars by the crane. This crane also loads the coal pockets from coal cars placed on a suitable track tributary to the pockets, a suitable track being installed for the movement of the crane between the coal pockets and the cinder pits. When required by the growth of the terminal, coaling facilities will be enlarged and the pockets will be served by the usual trestle and incline approach for the use of hopper cars.

The sandhouse is 50 feet by 20 feet. Sand is dried by a steam sand drier supplied with steam from the shop boiler room, and sand is delivered to an elevated bin by the usual compressed air system.

ROUNDHOUSE.

The roundhouse is of the Illinois Central standard design. As at present constructed, the house contains twenty locomotive stalls, an area being reserved on which to complete the circle when necessary. It is served by a 75-foot turntable, from which the stall tracks radiate at an angle of 10 degrees. The span of the house is 90 feet and the distance from inner face of door columns to center of table is 80 feet 1 inch. The walls of the house are of brick, resting on concrete foundation. The roof is of Illinois Central standard composition carried upon a wooden structure, supported by three rows of wooden posts. The roof is in two sections; the higher section sloping toward the outer wall, and the lower section sloping toward the turntable. A vertical portion of the struc-



LAYOUT OF LOCOMOTIVE TERMINAL AND CAR REPAIR SHOP OF THE ILLINOIS CENTRAL RAILROAD, NEAR BIRMINGHAM, ALA.

ture between the two sections of the roof is equipped with glass sashes and latticed windows, admitting the light at a point above the cabs of engines standing in the house and adding to the means of ventilation. Two locomotive stalls are equipped with a pit for dropping driving wheels and two others with a pit for dropping engine truck wheels, the jacks being hydro-pneumatic of 15 tons capacity and 60 inches lift. The house is arranged with air line for the purpose of firing up engines with oil.

FREIGHT CAR REPAIR YARD.

Two bad-order tracks 400 feet long are situated at the east end of the classification yard and the lead to the freight car repair yard is at this end. The freight car repair yard is northeast of the roundhouse and contains 4 longitudinal tracks. The repair tracks are served by two narrow-gauge material tracks placed between the first and second, and the third and fourth repair tracks.

SHOP BUILDING.

The building housing the several repair shops is situated at the west end of the freight car repair yard and between this yard and the roundhouse. The walls are of brick, carrying a wooden roof structure without intermediate supports. The various sections are separated by brick curtain walls.

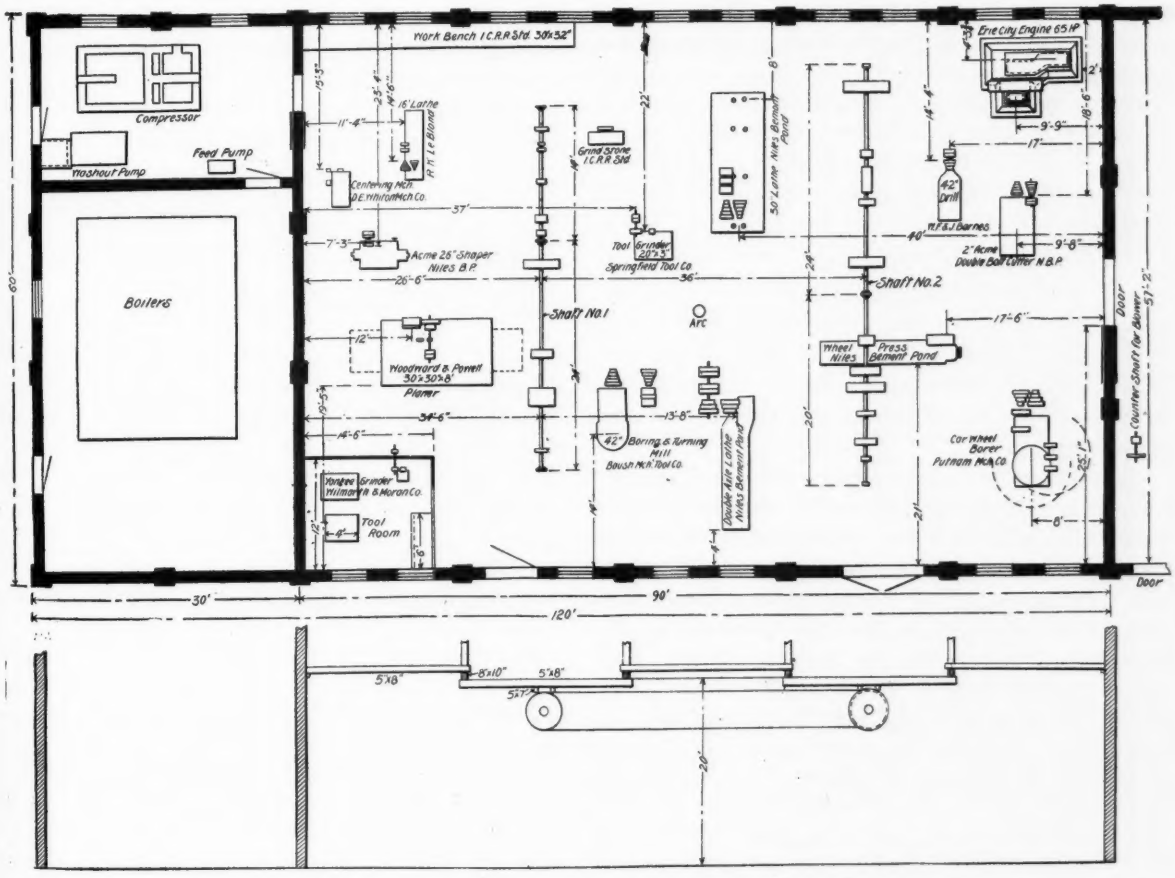
WOOD WORKING SHOP.

The section of this building containing the wood working machinery is adjacent to the repair tracks. It is 100 feet long by 60 feet wide. The layout of the machines is so arranged that unfinished lumber stored in the area tributary to the repair tracks, enters one of the end doors of the shop, passes through the various machines, traversing a path following the length of the shop, returns over another set of machines and passes thence to the repair yard. A continuation of one of the yard tracks traverses the full length of the wood working shop. The arrangement of the machines, shafts, etc., together with the method of drive, is shown by the accompanying line drawing.

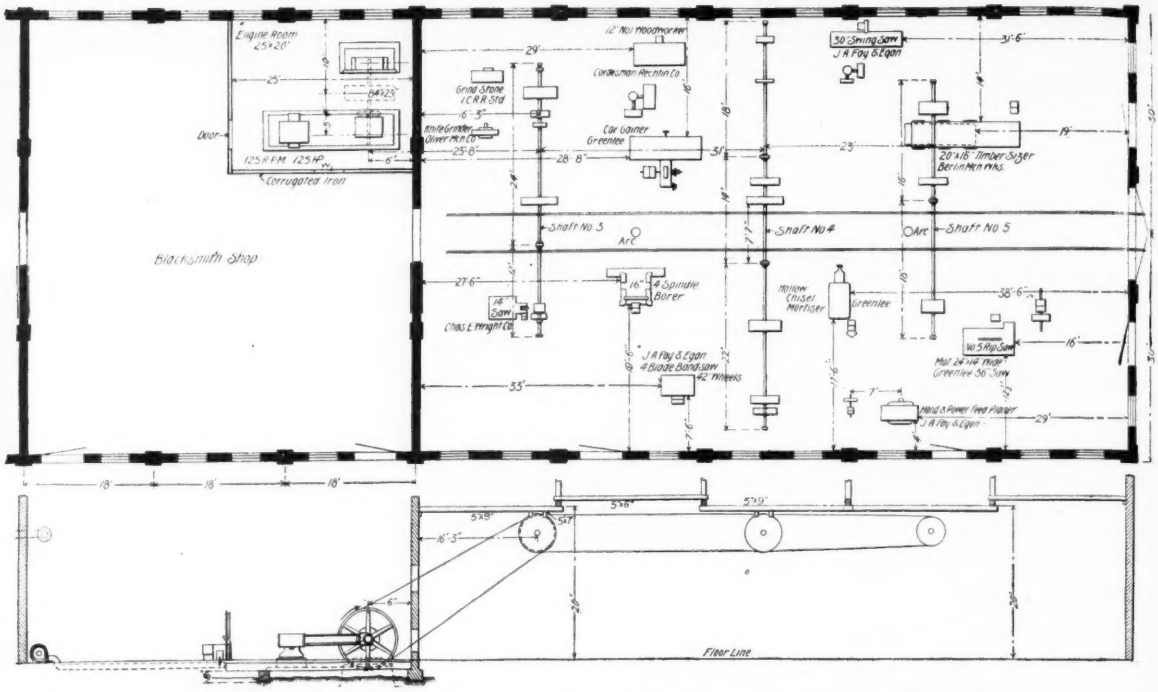
Power for driving the wood working machinery is furnished by a horizontal automatic cut-off steam engine of 125 horsepower, operating at 125 revolutions per minute. The engine room is 25 feet by 20 feet, occupying a portion of the section next to the wood working shop. The main belt passes through the wall of the shop.

BLACKSMITH SHOP.

The blacksmith shop is situated between the wood working shop and the machine shop. It is 60 feet by 50 feet and furnished with one fire receiving air from a No. 3 power driven blower.



MACHINE SHOP AND BOILER ROOM—ILLINOIS CENTRAL RAILROAD, NEAR BIRMINGHAM, ALA.


Engine Room 25×20'
125 R.P.M. 125 H.P.
Corrugated Iron
Door
Blacksmith Shop
Grind Stone I.C.R.R. Std
Knife Grinder Oliver Mch. Co.
12" No. 1 Woodworker Corbin Mch. Co.
Car Lanner Greenlee
30" Swing Saw J. A. Fay & Egan
20"x18" Timber Sizer Berlin Mch. Wks.
Shaft No. 3
Shaft No. 4
Shaft No. 5
16" 4 Spindle Borer
14" Saw Chas. L. Wright Co.
Mortise Chisel Mortiser Greenlee
No. 5 Rip Saw
Mat. 24"x14" Trim Greenlee 56" Saw
J. A. Fay & Egan 4 Blade Band Saw 42" Wheels
Hand & Power Feed Planer J. A. Fay & Egan
Floor Line

BLACKSMITH AND WOOD WORKING SHOPS—ILLINOIS CENTRAL RAILROAD, NEAR BIRMINGHAM, ALA.

MACHINE SHOP.

The machine shop is 60 feet by 90 feet and naturally is nearer the end of the building toward the roundhouse. It is provided with a machine tool equipment sufficient to handle locomotive running and emergency repairs, together with the wheel work and machine work required by freight car general repairs.

The arrangement of machine tools, shafting, etc., is shown by the accompanying line drawing. Power is provided by a horizontal steam engine developing 65 horsepower at 150 revolutions per minute. The engine is located in one corner of the shop.

STEAM AND AIR EQUIPMENT.

Steam for the entire plant is provided by a battery of 2 boilers, located in an end section of the main building, next to the machine shop. The boilers are of the horizontal fire tube type, each having a capacity of 150 horsepower.

A portion of the boiler section is arranged as an air compressor and pump room. The compressor has a capacity of 500 cubic feet and supplies air for the operation of air driven machines in the roundhouse and repair yards, as well as for filling and testing train lines in the classification yard. The compressor line is connected by a 2-inch pipe with an auxiliary reservoir at the freight yard, air being delivered to the several points of distribution throughout the yard by 1½ and 1¼-inch piping. This provision for the distribution of air throughout the yard secures a distinct saving in the movement of locomotives, as train lines may be filled and tested before an engine is coupled to the train, thus relieving the engine and reducing the time required for it to stand in the yard.

STORE AND OIL HOUSE.

The store and oil rooms are housed in an isolated building near the roundhouse. The building is 62 feet by 22 feet, a section 42 feet long with basement being devoted to the oil department and a section 20 feet long to the stores department. On each side is a platform 10 feet wide, extending the full length of the building. The south platform is served by a track continuing from the freight car repair yard. Oil tanks are located in the basement; means being provided for filling them directly from tank car. The oil is elevated to the floor above by means of compressed air.

CONSTRUCTION.

This car and locomotive terminal plant was designed throughout by the forces of the machinery and engineering departments of the Illinois Central Railroad. The construction work proceeded under the jurisdiction of the engineering department and the machinery and equipment were installed by the machinery department.

The Cassier Magazine Company announces the removal of its New York offices from No. 3 West 29th street, to No. 12 West 31st street, to which latter address all communications should hereafter be sent. The new home of Cassier's Magazine is in the office building just erected on the site of the former house of the American Society of Mechanical Engineers, a location especially convenient of access from the new railroad terminals and easily reached by the various systems of local transport from all parts of the city.

Standard Spring Rail Frogs

THE spring rail frogs in use today represent a number of designs, and in this article standard frogs of several railroads are described. There are also many different appliances, such as anti-creepers, holding-down devices, springs and stops, and a few of these are illustrated in the accompanying drawings.

A reinforcing bar for spring rail is shown in Fig. 1. In Fig. 2 several drawings of springs are given. Various designs of anti-creepers are illustrated in Figs. 3 to 7. Holding-down devices are shown in Figs. 8, 9 and 10, and stops in Figs. 11 to 14.

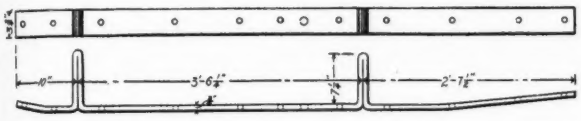


FIGURE 1—REINFORCING BAR.

Spring rail frogs are made both right and left hand for right and left hand turnouts. Where reference is made to the frog point, the actual point is meant unless it is termed the theoretical point. The following descriptions refer to the drawings.

CENTRAL RAILROAD OF NEW JERSEY.—The standard No. 10 spring rail frog is 15 ft. in length and 8 ft. 6⅜ ins. from heel to point. The frog has a 1⅞-in. flangeway and a 1⅞-in. throat. The frog is riveted to a 26x18x⅜ in. plate 8 ft. 4 ins. long. The fixed wing rail is 10 ft. long and the spring rail is 12 ft. long. The spring rail is planed down so that badly worn flanges may easily ride over the spring rail without moving it.

The standard double coil spring is located about 12 ins. back of the point and on the side opposite the spring rail. The spring bolt is fastened to an angle plate, which plate is bolted to the spring wing rail and reinforces it. This angle plate is ½ in. thick, is bent to fit web and flange of rail, is about 6 ins. wide and about 7 ft. long. The motion of this angle plate, together with spring rail, is controlled by guides which move in rectangular openings in the base plate to which the frog is secured. The angle plate serves to reinforce the spring rail, to hold down the spring rail and to prevent creeping of the spring rail.

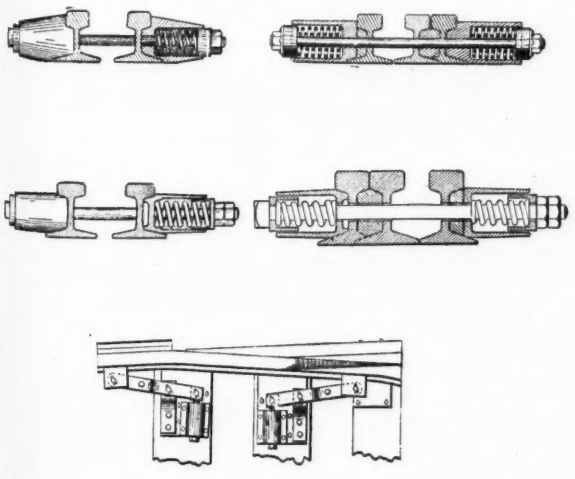


FIGURE 2—SPRINGS.

CENTRAL OF GEORGIA RAILWAY.—The standard No. 9½ spring rail frog is 15 ft. long and 7 ft. 9 ins. from heel to point. The frog is fastened to a number of base or bottom plates. The spring rail is planed down in order that badly worn flanges may pass over it without interference.

The spring rail is reinforced on each side for a distance of about 6 ft. with two wrought iron bars riveted to the rail. Two springs are used as shown in the bottom drawing of Fig. 2. These springs control the movement of the spring rail and in combination with the hinged links resist the creeping of the spring wing rail.

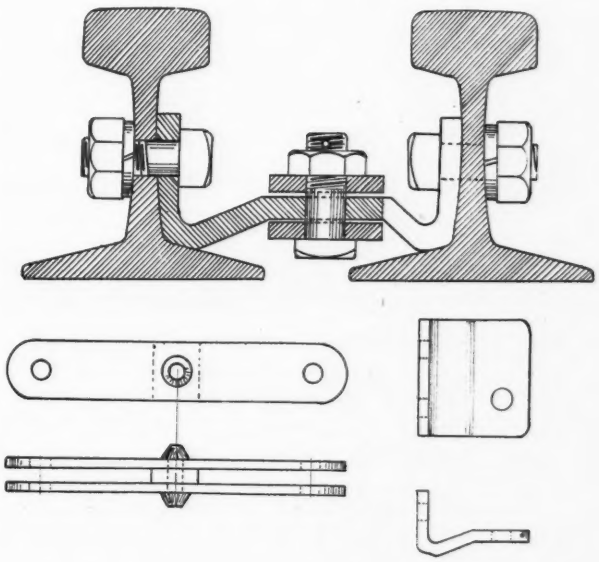


FIGURE 3—ANTI-CREEPER WITH DETAIL VIEWS DRAWN ON ONE-HALF SCALE.

The movement of the spring rail is limited by braces as well as the arms, to which the links in the spring combination are pivoted. A holding-down plate, passing through a guide riveted to the main point rail, is riveted to the movable wing rail.

CINCINNATI, HAMILTON & DAYTON RAILWAY.—The standard No. 10 spring rail frog is 15 ft. long and 8 ft. 6 ins. from heel to point. The flangeway is 1¾ ins. The frog is riveted to five base plates. The spring wing rail and short point rail are planed down to permit easy passage of badly worn flanges.

The spring rail is reinforced with a ¾-in. wrought iron bar, planed to fit between ball and flange of rail. The reinforcing bar is bent in a form similar to the one shown

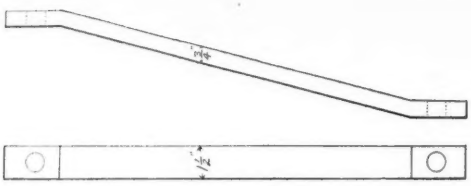


FIGURE 4—ANTI-CREEPER, PLAIN STRAP.

in Fig. 1. The cast-iron spring case and follower with double spring is located 12 ins. ahead of point.

Two combined hold-downs and stops are used and three braces. Two braces are used with frogs from No. 6 to No. 9 inclusive, three braces with frogs from No. 10 to No. 14 inclusive, and four braces with frogs Nos. 15 and 16. The anti-creeper is located in mouth of the frog and is of the design shown in Fig. 3.

CHICAGO & NORTHWESTERN RAILWAY.—The standard No. 10 spring rail frog is 15 ft. long and 8 ft. 6 ins. from heel to theoretical point. The width of flangeway and throat is 2 ins. Seven base plates are used. Both spring rail and short point rail have a ¼-in. groove to permit passage of badly worn flanges.

The spring rail is reinforced with a bar, fitting the ball and flange of rail and extending out 1⅛ ins. from head of rail. The reinforcing bar is flush with top of spring rail from heel to the theoretical point and is ¼ in. below top of spring rail from opposite theoretical point to toe of frog.

The spring is located about 12 ins. back of the point.

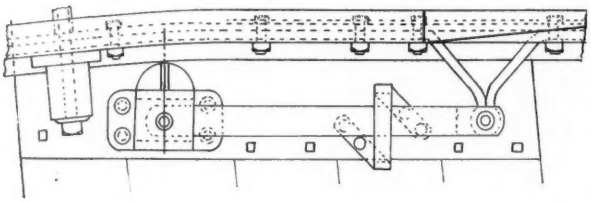


FIGURE 5—COMBINATION ANTI-CREEPER, HOLD-DOWN AND STOP.

It is similar in design to the upper right-hand drawing in Fig. 2. Five base plates, of ⅜ in. iron and 4 ins. wide, have ends turned up to form stops for base of spring rail. The design is shown in Fig. 14. Two hold-downs also act as stops for the spring rail.

Two hold-downs are similar in design to Fig. 8, with the exception that a bar, ½x2¼ ins., is riveted to the reinforcing bar. There is also a hold-down placed in the heel of frog and it is similar to the design shown in Fig. 10, with the exception that the plate and rod are made in one piece and that the rod is bolted at its end to the point and fixed wing rails. The anti-creeper in the mouth of frog consists of a cast-iron anchor block.

CHICAGO, BURLINGTON & QUINCY RAILROAD.—The standard No. 11 spring rail frog is 19 ft. 7 13-32 ins. long and is 9 ft. 8 11-32 ins. from heel to theoretical point. The frog has a 1¾-in. flangeway and a 1¾-in. throat. Nine base plates are used. The spring rail is planed ½-in. below frog.

Two reinforcing plates, 2½x7-16 ins. by 4 ft. 10 ins., are riveted to the spring rail. The spring is located about 1 ft. 11 ins. back of point and is similar in design to spring shown in upper left hand drawing of Fig. 2.

Two rail braces are located ahead of point. A holding down device is placed about 12 ins. back of spring and it is of the design shown in Fig. 8. An anchor block of the design shown in Fig. 7 is in mouth of frog.

CHICAGO, MILWAUKEE & ST. PAUL RAILROAD.—The standard No. 10 bolted spring rail frog is 15 ft. long and 7 ft. 2 ins. from heel to point. Four base plates are used. Both the spring and short point rails are planed ¼ in. to permit passage of badly worn flanges.

A ¾-in. reinforcing bar, 8 ft. long, is bolted to the spring rail. The spring is located ahead of the point of frog. Two base plates have ends turned, as shown in Fig. 14, to form stops for base of spring rail. Two holding down devices, similar to Fig. 8, are used. An anchor block is used in mouth of frog.

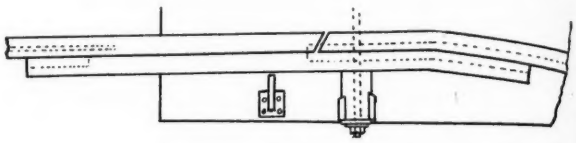


FIGURE 6—ANTI-CREEPER, HINGE RAIL.

CHICAGO, ROCK ISLAND & PACIFIC RAILWAY.—The standard No. 10 spring rail frog is 15 ft. long and 8 ft. 4 ins. from heel to point. Nine base plates are used. The spring rail is planed down to allow passage of badly worn flanges.

The reinforcing bar for spring rail is of the design shown in Fig. 1, being riveted to spring rail. The spring is located about 11 ins. back of point and is of the design shown in the upper right-hand drawing in Fig. 2.

Four base plates have ends turned up, as shown in Fig. 14 to form stops for spring rail. Two holding down devices, similar to design shown in Fig. 8, are used. The anti-creeper is of the design shown in Fig. 3 and is located in mouth of frog.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA RAILWAY.—The standard No. 9 spring rail frog is 15 ft. long and 8 ft. from heel to point. Seven base plates are used. The fixed wing rail is 10 ft. 6 ins. long and the spring wing

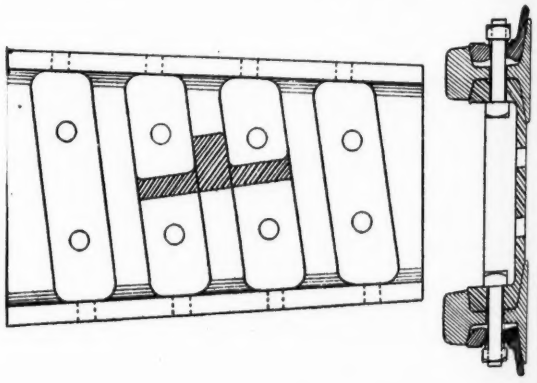


FIGURE 7—ANTI-CREEPER, TOE BLOCK.

rail is 12 ft. long. The spring rail is planed down to allow the passage of badly worn flanges.

The spring rail is reinforced with a bar fitting the section of rail and extending out about 1 in. from head of rail. The spring is located about 12 ins. back of point.

Four base plates have ends turned up, as shown in Fig. 14, to form stops for base of spring rail. Two holding down devices are used, similar to design shown in Fig. 8 with the exception that the bar entering the device is riveted to the reinforcing bar. There is also a hold-down at the heel end of the spring rail and this device is similar to design shown in Fig. 10. An anchor block is used in mouth of frog.

DELAWARE & HUDSON COMPANY.—The standard No. 9 spring rail frog is 15 ft. long and 9 ft. from heel to theoretical point. The frog is riveted to large base plate about 4 ft. long, and to 3 plates about 6 ins. wide. The

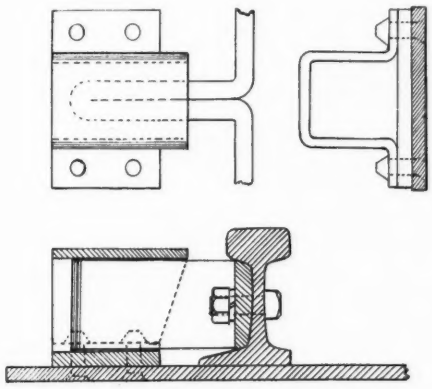


FIGURE 8—HOLDING-DOWN DEVICE.

spring rail is planed down to allow passage of badly worn flanges.

The spring rail is reinforced with a bar bolted to web of rail. One spring is located ahead of the point and is similar to design shown in Fig. 2. There is also a combined spring box and holding device, shown in Fig. 9, which is located back of the point. Besides the holding down device mentioned above, there is a combined holding down device and anti-rail creeper, which is located opposite point of frog, as is the design shown in Fig. 5. Two rail braces are used as stops in connection with above devices.

DENVER & RIO GRANDE RAILROAD.—The standard No. 10 spring rail frog is 15 ft. long and 8 ft. 3 ins. from heel to point. The flangeway is 2 ins. wide. The frog is riveted to a plate 19 ins. wide and 7 ft. long.

The spring is of the design shown in the upper right hand drawing of Fig. 2, and is located 15¾ ins. ahead of point. The spring rail is reinforced. A hinge rail is connected to the main rail by a bolt hinge and is connected to the movable part of the running rail by bolts. This design is shown in Fig. 6. It prevents creeping of the spring rail.

A stop of the design shown in Fig. 11 is used and also

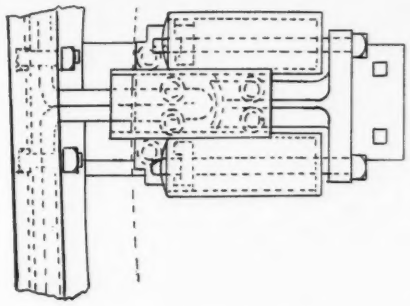


FIGURE 9—COMBINATION HOLDING DOWN AND SPRING DEVICE.

a stop is placed between the fixed and movable wing rails ahead of point. A hold-down device is also used back of point.

HARRIMAN LINES.—The standard No. 10 spring rail frog is 15 ft. long and 9 ft. 3 ins. from heel to theoretical point. Six base plates are used. The spring rail is planed down ⅜ ins. to permit passage of badly worn flanges.

The reinforcing bar is of the design shown in Fig. 1. The spring is of the design shown in upper right-hand drawing of Fig. 2 and is located 12 ins. back of point. A stop of the design shown in Fig. 12 is used. Two hold-down devices, shown in Fig. 8, are used. The anti-creeper is shown in Fig. 3 and is located in mouth of frog.

ILLINOIS CENTRAL RAILROAD.—The standard No. 10 spring rail frog is 14 ft. long and 7 ft. from heel to point. Four base plates are used. The flangeway is 2 ins. wide. The spring rail is placed down ½ in. to allow passage of badly worn flanges.

The reinforcing bar is of the design shown in Fig. 1. The spring is located 2 ft. 9 ins. ahead of point. Two stops of design shown in Fig. 13 are used. Two hold-down devices of design shown in Fig. 8 are used.

LEHIGH VALLEY RAILROAD.—The standard No. 10 spring frog is 15 ft. long and 9 ft. 6 ins. from heel to theoretical point. The flangeway is 1⅞ ins. wide. Five base plates are used. The spring rail is planed down ½ in.

The reinforcing bar is of the design shown in Fig. 1.

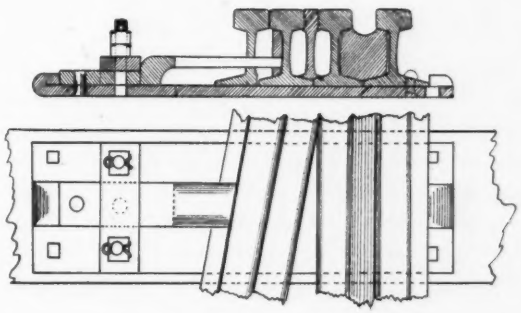


FIGURE 10—HOLDING DOWN DEVICE, USED AT HEEL END.

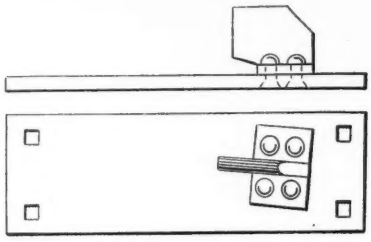


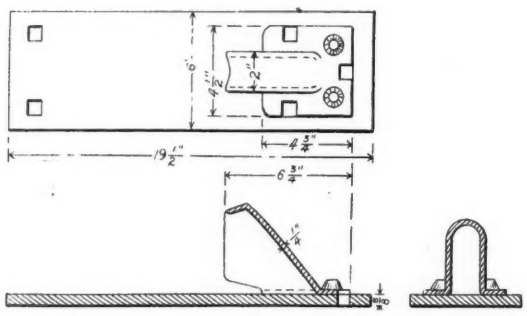
FIGURE 11—STOP, RIVETED TO TIE PLATE.

The spring is located 17 ins. ahead of point. One stop of design shown in Fig. 11 is used. Two hold down devices of design shown in Fig. 8 are used. The anti-creeper of design shown in Fig. 3 is located in mouth of frog.

MICHIGAN CENTRAL RAILROAD.—The standard No. 11 spring frog is 16 ft. long and 8 ft. 9½ ins. from heel to point. The flangeway is 2 ins. wide. Six base plates are used. The spring rail is planed down to allow passage of badly worn flanges.

The spring rail is reinforced with a bar similar in design to the one shown in Fig. 1. The spring is located about 19 ins. ahead of point. Three base plates are bent up, as shown in Fig. 14, to form stops for spring rail. Two hold-down devices of the design shown in Fig. 8 are used. An anti-creeper of the design shown in Fig. 3 is located in mouth of frog.

NEW YORK, NEW HAVEN & HARTFORD RAILROAD.—The



FGURE 12—STOP, RIVETED TO TIE PLATE.

standard No. 10 spring rail frog is 16½ ft. long and 8 ft. 4 ins. from heel to theoretical point. The flangeway is 2 ins. wide. One base plate, 45x19x23½x¾ ins., is riveted to frog, and seven tie plates are used. The spring rail is planed down to allow passage of badly worn flanges.

The spring rail is reinforced with a bar which is bent out for connection with anti-creeper and hold-down device. The spring is located about 14 ins. ahead of point. Two rail braces are used as stops. A combined anti-creeper, hold-down and stop device, shown in Fig. 5, is used. At the heel end of spring rail there is a holding-down device similar to design shown in Fig. 8.

PENNSYLVANIA LINES WEST OF PITTSBURGH.—The standard No. 10 spring frog is 15 ft. long and 8 ft. 6 ins. from heel to point. Five plates are used with frog. The spring and short point rails are planed down to allow passage of badly worn flanges.

The reinforcing bar is of design shown in Fig. 1 and is bolted to spring rail. A double coil spring, similar to design shown in upper right hand drawing of Fig. 2, is located ahead of point. Three tie plates are bent up, as shown in Fig. 14, to form stops for base of rail. Two holding-downs of design shown in Fig. 8 are used. An anti-creeper of design shown in Fig. 3 is located in mouth of frog.

PERE MARQUETTE RAILROAD.—The standard No. 10 spring frog is 15 ft. long and 8 ft. from heel to point. One base plate, ⅝x14x18x48 ins., and 4 tie plates are used. The spring rail is planed down to allow passage of badly worn flanges.

The spring rail is reinforced. Spring is located ahead

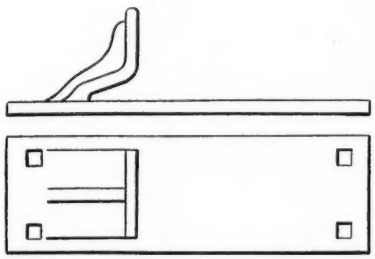


FIGURE 13—STOP, RAIL BRACE.

of point. Two tie plates have ends turned up as shown in Fig. 14 to form stops for base plate. One stop is riveted to main base plate and consists of a bar, ¾x2x6 ins. A holding-down device is located at heel end of spring rail. An anti-creeper of design shown in Fig. 3 is located in mouth of frog.

PHILADELPHIA & READING RAILWAY.—The standard No. 10 filled and bolted spring rail frog is 15 ft. long and 9 ft. 3¼ ins. from heel to theoretical point. The width of flangeway is 1¾ ins., and width of throat is 2 ins. Nine tie plates are used. The spring rail is planed down.

The reinforcing strap for spring rail is ¾ ins. thick. The spring is located ahead of point. Four stops of a form similar to design shown in Fig. 13 are used. A holding-down device, shown in Fig. 10, is used toward heel end of spring rail. The anti-creeper located at toe of frog consists of a plain strap shown in Fig. 4.

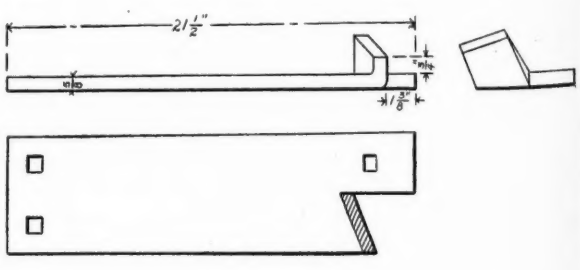


FIGURE 14—STOP, TIE PLATE WITH END TURNED UP.

Hoop Reinforcement of Concrete Columns

AFTER the completion of tests on band-hooped and spiral-hooped reinforced columns, Prof. A. N. Talbot, in his summary of results, makes the following statement:

The writer feels that there is yet much to be learned about concrete and reinforced concrete columns. After making the tests described he has had to give up several preconceived notions of the action of hooped concrete, notions based upon meager statements of tests and analyses made from assumed conditions. The tests here given are not altogether conclusive, but they may help to clear up uncertainties and give an idea of the action of concrete when restrained by hooping. The tests on plain concrete columns also bring out instructive results. The following observations on the tests may be made:

1—The average ultimate strength of the plain concrete columns at ages not far from 60 days is as follows: 1-1½-3 concrete, 2,300 lb. per sq. in.; 1-2-4 concrete, 1,740 lb. per sq. in.; 1-3-6 concrete, 1,030 lb. per sq. in.; 1-4-8 concrete, 575 lb. per sq. in. The effect of the amount of cement used in the concrete is very marked, and cement is shown to be an economical reinforcing material for compression members. The average variation of individual results from the average strength in the case of 1-2-4 concrete about 60 days old is 12 per cent, ranging from 34 per cent below to 25 per cent above the average. The tests made at an age of six months indicate an increase of something like 15 per cent over the strength at 60 days.

2—The average initial modulus of elasticity of 1-2-4 concrete columns at an age of about 60 days was 3,040,000 lbs. per sq. in., as compared with 2,250,000 lbs. per sq. in. given for the columns in Bulletin No. 10. The larger value is due in part to the denser and harder concrete used.

3—Poisson's ratio for concrete in compression is a variable quantity, increasing considerably just before the ultimate failure of the concrete. The value varies with the age and nature of the concrete. A value of 0.1 to 0.16 for 1-2-4 concrte 60 days old may be tentatively given for the lower loads, with values as high as 0.25 or 0.3 near the crushing load. This concrete set in air.

4—The repetition of a load gives an increased amount of shortening and an increased set, the amount of this increase varying with the amount of the load. For the lower loads the increase becomes small after a small number of repetitions. For the higher loads the effect of continued repetition is much more marked. The phenomena attending repetitive loading of columns are important and merit much fuller investigation.

5—In hooped columns the hooping does not come into action to any great extent before a load equivalent to the ultimate strength of plain concrete, or a little below, is reached. The longitudinal deformation and the lateral deformation are not modified by the hooping to any great extent before this load is reached.

6—Beyond this load the column shortens rapidly and the hooping receives additional stress correspondingly and its function in restraining the concrete laterally becomes important. If the column maintains a straight position, the limit of strength may be expected to come when the stress in the hooping exceeds the yield point of the metal. If the column deflects laterally through eccentric loading or lack of uniformity in the concrete or in the distribution of the hooping, a lower strength will be found.

7—The additional strength of the hooped column over that for an unreinforced concrete column of the same quality, as determined from the stress-deformation diagram, averages for each one per cent of hooping 955 lbs. per sq. in. for the spiral-hooped columns and 669 lbs. per sq. in. for the band-hooped columns having a diameter of 12 ins. The additional strength per one per cent of reinforcement is much the same for 1-4-8 concrete, 1-2-4 concrete, and 1-1½-3 concrete, but it must not be overlooked that the 1-4-8 concrete is much less stiff than are the columns with richer mixtures, especially after the hooping is brought into action. The difference between the strength of columns with high-carbon wire and with mild-steel wire is not marked enough to warrant drawing conclusions.

8—For loads which bring the hooping into full action the increase in the longitudinal deformation and in the lateral deformation are approximately proportional to the added load. The ratio of lateral to longitudinal deformation is more nearly constant than for plain concrete. Through this stage the ratio of increment of load to increment of longitudinal shortening is low, the averages for columns with band-hoops being 184,000 and with spiral hoops 165,000. This ratio is very much less than the modulus of elasticity of concrete and the hooped columns through this stage of loading are correspondingly less stiff than concrete columns. The amount of the set produced by the higher loads is very great.

9—The total amount of shortening before failure occurs is very great, averaging something like six to twelve times that for plain concrete and fifty times that for the ordinary working stresses in concrete. At the maximum load it is somewhat less than this, say five times as much as plain concrete and perhaps five times that of mild steel at its elastic limit. Cracking and peeling of the concrete are apparent at loads corresponding to the ultimate strength of concrete.

10—The excessive amount of compression before failure affects the problem of combining hooping and longitudinal reinforcement very unfavorably, if the stresses are to be kept within the elastic limit of the latter.

11—The lateral deflection of hooped columns is large and may seriously affect the ultimate strength which is available for the column. For continued application of stress beyond the maximum load, the column deflects

enormously. Scaling of the surface of the concrete and lateral deflections are warning signs given well before danger of failure exists.

12—The concrete itself retains a considerable element of its strength even after it has been shortened in a hooped state four or five times as much as would produce failure in unhooped concrete columns.

13—Columns of rich and lean concrete exhibit phenomena of similar characteristics, the hoop stress becoming effective at the ultimate strength of unhooped concrete.

14—The one experiment indicates that hooped columns will resist eccentric stresses in somewhat the same way as will other material.

15—Light hooping offers security against sudden failure and unevenness of concrete and will enable higher working stresses to be used. In combination with rich concretes and longitudinal reinforcement, using low stresses in hoops (i. e., basing the strength upon an assumed ultimate strength but little beyond the average ultimate strength of plain concrete), a satisfactory column may be made. It is suggested that a column of this character may be designed in such a way that the longitudinal reinforcement may carry the load during construction and still not be over-stressed later with the final loading, provided the basal point for use with the factor of safety in determining the working strength of the column is somewhat below the ultimate strength for plain concrete.

16—Heavy hooping gives added strength, but in utilizing the full strength of such columns the column shortens unduly, deflects laterally, and will strain longitudinal reinforcement many times beyond the deformation which exists at the elastic limit of the metal. It may be applicable where a large limit of safety is desired or where large variations in shortening are unobjectionable, as where the structure is articulated. So far as ultimate strength is concerned, hooping adds two to three times as much strength to the column as does an equal amount of longitudinal reinforcement, but with the extreme amount of shortening and the liability to lateral deflection it may be doubted whether this increase of strength may be utilized to any great extent in ordinary construction.

Standard Third Rail Location

The American Railway Association has recently issued circular No. 818A, which contains diagrams of limiting permanent way and rolling equipment clearances that permit of standard third rail location.

Mr. W. G. Besler, as chairman of the Committee on Standard Location for Third Rail Working Conductors, sent out the circular concerning a matter of mutual interest to railroad and construction companies and advised that additional copies are obtainable through him or the secretary of the American Railway Association. In his letter to construction companies he gives the following information:

The purpose of transmitting this diagram to various construction companies is that it may be placed in your draughting or designing department so that any equipment or structures, which your company may be called upon to design or construct, may be designed and constructed with reference to and having in mind the limitations prescribed by the American Railway Association in this report which it has adopted.

While every railroad company has been furnished with a copy of this report, etc., it is possible that after a time some officer may overlook this limitation and will find himself embarrassed by equipment or permanent way structures which will interfere with his company's ability to exchange equipment, etc., or use equipment in interchange. Therefore, this circular is sent to you with the thought that you may, in designing equipment for any company, call attention to the limitations, providing your attention is not directed to it by the railroad company.

The Process of Producing Cresote Oil

ONE of the by-products in the manufacture of gas is a heavy, strong smelling, black liquid which is collected in the cooling of the gas and is known as coal tar. This is an exceedingly complex mixture of substances. From it are obtained not only creosote oil, but most of the dyes which are used now-a-days, perfumes, and even flavoring extracts.

Gas, coal tar and coke are also made in what is known as the by-product coke oven, which is adapted to different objects but is operated on the same principle. Its coal tar is equally as good as the gas works tar for making creosote oil. In recent years a great amount of gas has been made in the United States by another process, and is known as water gas. This process also produces a tar, which looks much like coal tar and is often difficult to tell from it. But this tar is really derived from petroleum, and does not make a good oil for preserving wood from decay. Wood creosote, with which so many people are familiar, is likewise obtained from a wood tar which is produced by distilling wood. But like water gas tar creosote, wood creosote is not so good for wood preservation as is the coal tar creosote. When creosote is bought for that purpose, therefore, it should be certain that it is coal tar creosote.

To obtain creosote oil from coal tar the tar is, in its turn, distilled. But this distillation is like that used for other liquids instead of that employed for the coal. The still is heated, and as the heat increases the "light oils" first pass over. Among these is the familiar carbolic acid. This is a powerful antiseptic, but it is not desirable in a wood preservative, for it evaporates so readily that it soon becomes lost from the wood. When a temperature of about 400 degrees has been reached, the distillate is turned into another receiver, and from this point on to 600 or 700 degrees creosote oil is produced. One of the substances which is contained in this mixture is

"naphthalene," from which common moth balls are made. Coal tar creosote, thus produced, is the great wood preservative.

The residue remaining in the still after the distillation is "pitch," which is used chiefly in the preparation of roofing felt. In America roofing pitch is the chief end for which tar is distilled. In Europe this is not so true. Now pitch for roofing must be rather soft. Therefore tar distillation is not carried so far in this country as it is in Europe. For creosote oil it would be better if it were carried farther, since the substances which distil at the higher temperatures in most cases neither evaporate in the air nor dissolve in water as readily as those which distil more easily. Consequently they stay in the wood for a longer time, and protect it correspondingly longer from decay. Much study is being devoted by the United States Forest Service to creosote oil, to determine what its composition should be to give the best results in preserving timber, under different conditions, and how the most desirable creosotes may be obtained. The reports of these studies, together with detailed description of the more economical processes of applying the preservatives to wood have been worked into circulars which the government has placed at the disposal of all users of timber and which will be furnished to all who make the request of the Forester at Washington.

Ballasting

THE subject of ballasting was discussed recently in a paper presented by Mr. Con. Enright before the Iowa Railway Club. The opinions expressed in this paper are from a man whose experience covered a period of 40 years. An extract of the paper is as follows:

The various railway systems of this country have experimented with an untold variety of ballast and even to-day the preferences of the various roads are as varied as the kinds of ballast. Any ballast which will not retain moisture but through which the water will percolate freely is good. Crushed rock ballast, while it complies with this fundamental requisite and also is dustless, is not the best way, to my notion, for the reason that it is too shifty on open ground, too solid and inelastic and is difficult to keep in good surface. It is valuable in a seepy cut but should be covered with from four to six inches of cinders or similar material.

In my opinion there is no ballast superior to cinders. Water is not retained in it, cinder ballast settles well, keeps a good surface and the ties do not work loose in it.

A mud roadbed, which is the bane of many a trackman's existence, can be kept in fair shape if the crown or roof is not disturbed in wet weather. In raising low joints in rainy season on such roadbed, raise the tie under the joint as high as possible. Do not loosen the dirt about the tie but "borrow" a fence board and push loose dirt under the tie from each end. Thus you have the joint raised without breaking up the crown of the bed.

Speaking of disturbing track, it has been my observation that the average foreman fails to get the greatest efficiency out of his gang through a failure to systematize his work. The work of reballasting and track raising should especially be reduced to a system. Where ballast is shoveled or dumped from ballast cars without the use of a plow, there will be intervals representing the car coupling spaces which will not be covered. These bare spots should be filled in at once from both ends. As the ballast distributors advance they should be followed up by a man digging jack pits. Thus, when the track raising gang begins there are no unnecessary delays but the ties can be jacked up and the ballast shoveled and tamped under them as fast as the gang can advance. In this connection I wish to say that I do not think ballast should be tamped under a tie from end to end. It should not be tamped more than one foot inside each rail and shovel packed in the center. The weight of passing trains make the part of the ties under the rails settle and if the center line is tamped solid the track will soon balance on this center and then get out of line.

The introduction into common use of passenger coaches equipped with long trucks carrying six and eight wheels with their resulting rigidity, makes an increased wear and strain upon curves. This may be overcome to a great extent and curves become almost as easy traveling as tangents if the curved track is adjusted one-half inch wider than the gauge, some section men cannot be taught to use the ordinary gauge correctly but will invariably have one end pointing toward Chicago and the other toward Omaha, and then they wonder why the track is too narrow. I would advise the universal adoption of the "V" gauge, for with it the track cannot be gauged incorrectly.

In these days when timber is becoming so scarce and the cheapest of ties run into money so fast, it behooves the roadmaster, who wishes to make a good showing of economy on his division, to instruct his section foremen in the care and preservation of ties. Ties will last years longer than they ordinarily do on many sections if the foreman understands his business. In many instaces a rail will bed into a tie a half to three-quarters of an inch; such a tie, the ordinary section boss would spot to throw out. This is a mistake, for the tie is all right. All that is needed is a half-inch shim inserted in the depression. Then again, many section men when they have occasion to draw the spikes from a tie, make the mistake of driving the spikes into new holes, leaving the old ones to fill with water and rot the tie. A one-fourth inch plug inserted in the old hole is all that is necessary to make the spike hold firmly in its old place.

I have often thought that the roads would do well to place a special section gang of experienced men at the disposal of each of their roadmasters. The road-

master could send his gang over the division every week or ten days hunting trouble. Where their services were especially needed these men could assist and direct the local section men and could conduct a sort of school of instruction.

In my humble estimation, the railways are making a great mistake in employing cheap men on their section gangs. From the section hands of to-day must be chosen the foremen of tomorrow. Not only is this true, but the companies should consider that the safety of the traveling public is dependent in a great measure upon the care and efficiency of the section men all along the line. Nor is the hiring of cheap men true economy, for such men do not accomplish any more than their pay indicates, usually not as much. I would rather have under me 15 $2-a-day men than 24 $1.25-men, for the higher priced men put some intelligence into their work. Mistakes are costly everywhere, but in no place do they cost a railway company more than in defective track construction or repair.

Heretofore in this paper I have mentioned the wear and strain which falls upon curves. I have long had in mind the working out of a device which, I believe, would obviate much of this. It is a well known fact that oil applied to the bearing edge of the outside rail on a curve will lessen friction and help prevent the wheels from riding the rail at such places. A self-oiling device attached to the engine tender, so arranged that as the train rounds a curve and hugs the outside rail, the snout of the oiler will distribute a little crude oil on the inside of the rail, is the working principle I have thought of. Possibly some inventive mind in your club will take up this suggestion and devise such an appliance. It would not only lessen wear and strain on the rails but would prevent a great many derailments.

Study of Southern Forests

An important step in the general movement to bring many of the rich stands of timber in the South under a scientific plan of forest management is the offer made by the school of forestry of the University of Georgia at Athens, Ga., to furnish timber owners experts who will examine and report upon any of the forests in the State.

The object of the offer is to collect information in regard to the forest resources of the State, to spread a knowledge of forestry and to improve forest conditions. The forest school will furnish the experts free and the only expense which will be borne by the forest owner will be paid for the traveling and subsistence expenses of the expert while making the examination. In cases where several owners of the same locality apply the expenses will be prorated.

When applications for examination are made, the owners have been asked to give their names and post office addresses, location of tract, area of tract, character of forest as shown by the kinds of trees growing on the land, the conditions of the forest, whether mature, original or second growth, whether the land has been burned or cut over, and the wishes of the owner regarding the use of the land.

Walter G. Berg

Mr. Walter G. Berg, chief engineer of the Lehigh Valley Railroad, died suddenly in New York City, May 12th, aged 50 years and 5 months.

Mr. Berg was a native of New York City, and received his education in Stuttgart, Germany. He entered railroad service in 1879, and up to the day of his death was actively engaged in railroad engineering practice. His first engineering work was with the Delaware Bridge Co., as draftsman and bridge engineer; from 1880 to 1881 he was engineer of bridges of the Richmond & Allegheny Railroad; from 1881 to 1882, engineer in charge of the same road; from 1882 to 1883, principal assistant engineer of the East Tennessee, Virginia & Georgia Railroad. In 1883 he entered the service of the Lehigh Valley Railroad, and continued in the employ of that company until his death. Entering the service of the Lehigh Valley as assistant engineer, he was successively principal assistant engineer, engineer maintenance of way and chief engineer.

Mr. Berg was a member of the American Society of Civil Engineers, Roadmasters Association, Past-President of the Association of Superintendents of Bridges and

WALTER G. BERG.

Buildings, and President of the American Railway Engineering and Maintenance of Way Association. He was the author of numerous works on railroad engineering, among them being "Bridges and Buildings of American Railroads," "Buildings and Structures of American Railroads," "Shops and Roundhouses," "Classification of Maintenance of Way Accounts," etc.

Mr. Berg was a charter member of the American Railway Engineering and Maintenance of Way Association, and was the first chairman of the Committee on Buildings. In 1904 he was elected a member of the Board of Direction; in 1906 he was elected Second Vice-President, advancing to First Vice-President in 1907, and in 1908 was elected President.

To Mr. Berg belongs the credit of the "Manual of Recommended Practice for Railway Engineering and Maintenance of Way Work," issued by the American Railway Engineering and Maintenance of Way Association. To the perfection of this volume he devoted especial care and to his genius is largely due the value it has attained as a reference book in railway engineering offices.

President Roosevelt designated Mr. Berg to attend the conference at the White House on the Conservation of Natural Resources as representative of the American Railway Engineering and Maintenance of Way Association.

Personals

Professor Ira O. Baker, for 34 years connected with the Department of Civil Engineering of the University of Illinois, has been granted by the Trustees leave of absence for one year from July 1, 1908. It is understood that Professor Baker will devote himself to the work of revising his well-known book on "Masonry Construction." The executive duties of the Department of Civil Engineering will, during his absence, be assumed by Professor J. P. Brooks.

Mr. Stanley Millard, chief engineer of the Peoria & Pekin Union, has resigned. Mr. Walter E. Emery, formerly engineer maintenance of way of the Chicago & Alton, succeeds Mr. Millard.

Mr. Everett E. Stone has been promoted from engineer maintenance of way and structures to chief engineer of the Boston & Albany, with headquarters at South Terminal Station, Boston, Mass.

Mr. C. E. Carson, formerly division superintendent of the Colorado & Southern, has been appointed terminal superintendent of the Mexican Central at Tampico, Mex., in place of Mr. J. J. Lewis, resigned.

Mr. C. P. Temple has been appointed roadmaster of the Cincinnati, Hamilton & Dayton at Hume, Ill., in place of Mr. C. Nolan, resigned.

Mr. Thomas Rolland has been appointed roadmaster of the Baltimore & Ohio Southwestern at Mitchell, Ind., in place of Mr. Thomas W. Welsh, resigned.

Mr. S. T. Earley has been appointed general roadmaster of the Newton & Northwestern and Ft. Dodge, Des Moines & Southern at Boone, Ia., in place of Mr. J. A. Bryant, resigned.

Mr. L. G. Murphy, assistant engineer of maintenance of way and construction of the Boston & Albany, has been appointed assistant to Mr. E. E. Stone, chief engineer, with office at Boston, Mass.

Mr. J. M. Marshall has been appointed superintendent of bridges and buildings of the Arkansas, Louisiana & Gulf, with headquarters at Monroe, La.

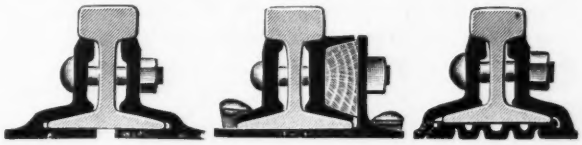
Mr. W. F. Sparks, roadmaster of the Missouri, Kansas & Texas, at Houston, Tex., has been appointed roadmaster of the St. Louis Southwestern at Commerce, Tex.

Mr. E. B. Ashby, engineer of maintenance of way of the Lehigh Valley, has been appointed chief engineer, with headquarters at 143 Liberty street, New York, succeeding W. G. Berg, deceased.

Mr. W. J. Burton has been appointed division engineer of the St. Louis terminals of the Missouri Pacific, with headquarters at Seventh and Poplar streets, St. Louis, Mo., in place of Mr. F. W. Bettle, transferred.

Continuous, Weber and Wolhaupter Rail Joints

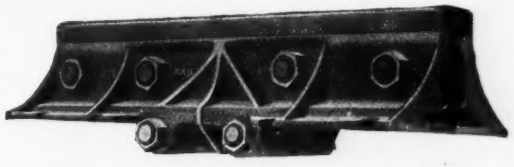
The Rail Joint Company, 29 D. 34th street, New York, manufacture, together with many other designs of rail joints, the following particular designs: The continuous joints, Weber joints and Wolhaupter joints, all of which are illustrated herewith. These base supporting rail joints are intended to sustain rail ends, admit of the continuous wave motion of the rail and eliminate pounding of rail ends, thus securing correct surface and alignment.



CONTINUOUS, WEBER AND WOLHAMPTER JONTS.

Atlas Rail Joints

The Atlas Railway Supply Co., Manhattan building, Chicago, manufactures the rail joint, illustrated herewith, which is their standard joint. The important features of Atlas joints are stated as follows: The large bearing surface on the ties and the large contacts with the rail and the lower truss bolts, which in the suspended joint are between the ties and in the supported joint on either side of the tie. The company also manufactures a one-piece joint combining an angle bar and bed plate in one piece, used in connection with a plain angle or splice bar. The latter joint is applied on the outside of the rail.



ATLAS RAIL JOINT.

Bonzano Rail Joint

The Quincy, Manchester, Sargent Co., Chicago and New York, manufacture, among other designs of rail joints, the Q. & C.-Bonzano rail joint, illustrated herewith. The part of the splice plate, which fits between head and base of rail, is made in the usual manner. The lower part of the splice-plate projects outwardly beyond the edge of the rail and is on a level with the base of rail, giving additional bearing on the ties and lateral stiffness to the rail. The middle part of the projecting flange is turned down without cutting to an angle of about 90 degrees. The horizontal flanges, which form the end bearings of the top member of the splice and also the bearing for the gusset-shaped tie bars, give a strong and rigid truss.

The joint is simple in design and can be easily installed, requiring no special instructions for the work. The joint also acts as an anti-creeper. The first cost is only a trifle more than that of an angle bar, where tie plates are used.

Trade Notes

The Central Railroad Company of New Jersey, 143 Liberty street, New York, has for sale a second-hand bridge, which consists of three similar spans. A brief description of the bridge is as follows:

Each span is 146 ft. centre to centre of end pins, and was built by the Phoenix Bridge Company, for use by standard gauge locomotives having 96,000 lb. on four driving axles.

Each span consists of a single track, through pin connected truss, the end posts being on a skew of 30 degrees. The left hand truss is 9 ft. 3 ins. in advance of the right hand. All other pairs of posts are opposite each other, making it entirely practicable to change the skew or make a square bridge by changing the end panels only.

The trusses are 16 ft. apart centre to centre and the track stringers are 8 ft. apart centre to centre. The distance from base of rail to under clearance (using a tie 7½ ins. in thickness) is 4 ft. 2 ins.

The weight of each span is approximately estimated at 120,000 lb., or a total of 360,000 lb. for the three spans.

The material in this bridge is of wrought iron and is in excellent condition. The bridge is suitable for use by a railroad using engines with about 100,000 lb. on four drivers, or by a heavy electric railroad line, or as a heavy highway bridge.

The various members of the bridge are to be match-marked before the bridge is taken down, and a diagram prepared for use in erecting.

If you are interested, further information can be secured by addressing Mr. W. G. Besler, vice-president and general manager.

The Raymond Concrete Pile Company, of New York and Chicago, was awarded a contract by George A. Kimball, chief engineer of elevated and subway construction for the Boston Elevated Railway, for placing concrete piles for the foundations of the incline walls, at the north approach to the East Cambridge extension of that road.

The Standard Steel Tie Co. has opened offices at 714-15 Curry building, Pittsburg, Pa. The company will manufacture steel ties and fasteners, for both steam and electric railway service.

The H. A. Fuller Iron & Steel Co., St. Louis, Mo., has been incorporated with $10,000 capital stock by A. D. Fuller, Lyle Garrison and H. A. Fuller, to deal in railway supplies.

The George M. Newhall Engineering Co., Ltd., 136 South Fourth street, Philadelphia, announces the apointment of David Newhall as manager of its department of supplies for railroads, manufacturers and contractors.

American Railway Appliance Company, Wilmington, Del., has been incorporated in the state of Delaware with a capital of $100,000. The incorporators are: F. M. Shive, S. E. Roberson, Harry W. Davis.

The American Automatic Railway Switch Co., Birmingham, Ala., has been incorporated with $500,000 capital stock to manufacture railway switches, frogs, etc.; Harold Shernwell, president; J. R. Vail, vice-president; Ben F. Barbour, secretary; J. B. Dryer, treasurer.

Technical Publications

THE ELEMENTS OF RAILROAD ENGINEERING, by W. G. Raymond, C. E., L. L. D. Published by John Wiley & Sons, New York. Cloth binding, 405 pages, 6x9 ins., illustrated. Price, $3.50.

The introduction deals briefly with railroad political economy. The first part of the book covers more particularly track construction and in the second part the locomotive and its work, together with grade problems, are discussed. In the third part railroad location, construction and betterment surveys are treated in detail. An appendix is also included on "The Location of the Knoxville, LaFollette and Jellico Railroad, of the Louisville and Nashville system," by W. D. Taylor, together with discussions.

The book should be of particular value to the student entering upon the study of railroad engineering and to others who desire a general discussion of the principles of design in the layout of a railroad plant.

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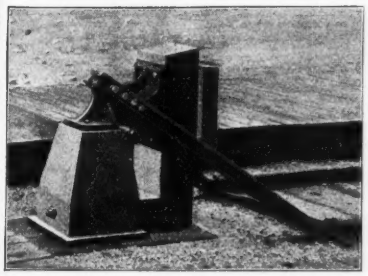

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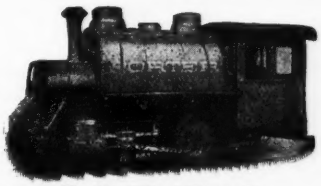

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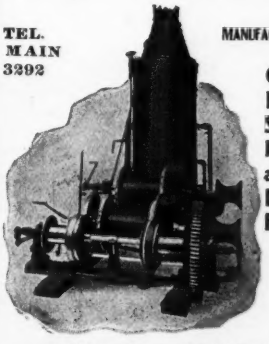

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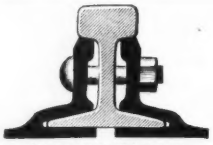

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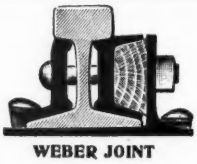

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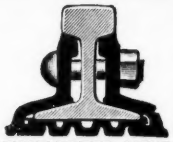

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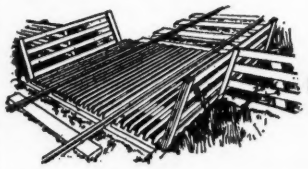

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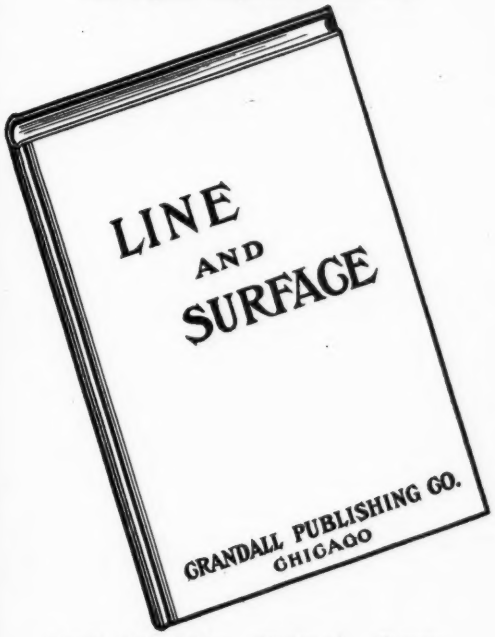

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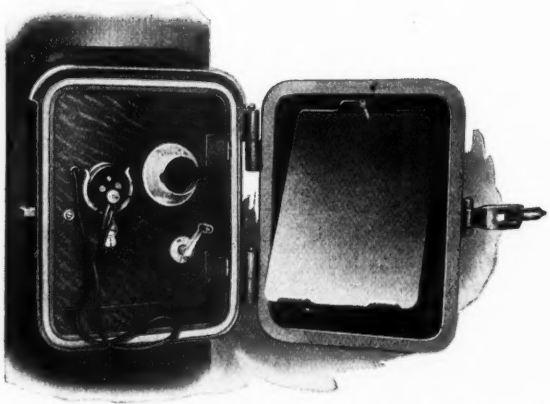

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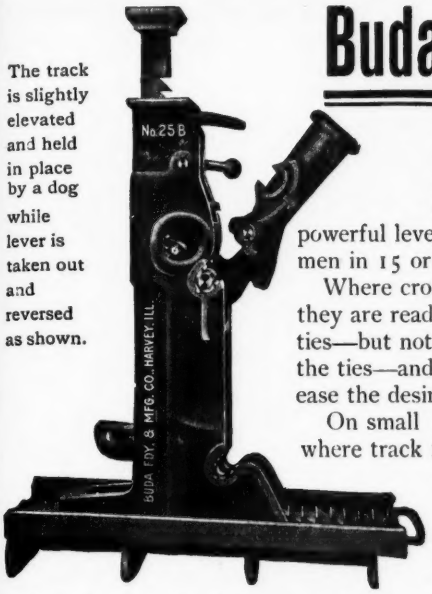

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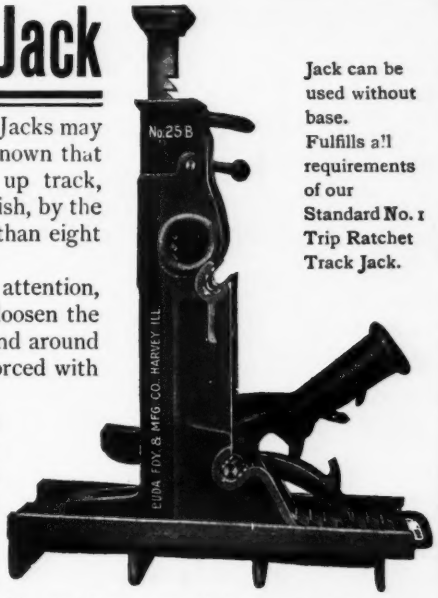

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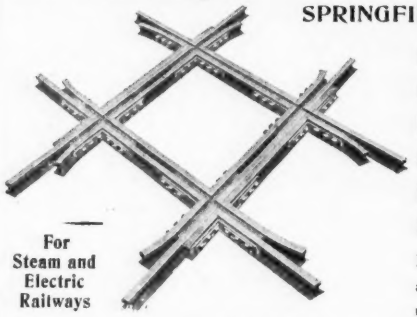

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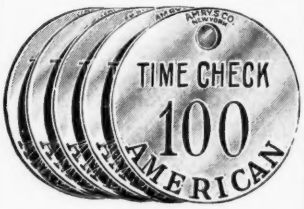

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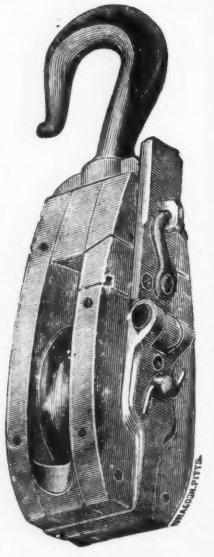

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